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Gold and Silver in Chile

By Mark R. Lamb*

SYNOPSIS—A short description of the various operating gold and silver mines of Chile. The field for American engineers never was great and Chilean engineers are beginning to fill even what field there was.

We have frequent inquiries from the States regarding the opportunities on the West Coast for skilled gold and silver miners and metallurgists, but the openings are so scarce that it is no pleasure to reply. Perhaps a few lines of description of each of the operating properties will be of service to enough people to warrant their publication.

The most important property is the Compañía de Minas y Beneficiadora de Taltal, with a mine and cyanide mill at Cachinal. The company is owned by Chilean capital and is under the direction of G. P. Ives, of Houghton, who designed and built the plant to replace an amalgamation plant. The cyanide plant is able to treat low-grade silver ore, and for that reason has been successful, as ores which cannot be amalgamated, and even waste dumps, are turned into ore by his success with the cyanide plant.

The capacity of the mill is 30 tons daily. The cyanide loss is 2 lb. per ton of ore, or 1½ lb. per lb. of silver produced. The ore is crushed in two ball mills, milling to 14 mesh. Extraction is between 80 and 85%.

Profit is made on ore containing 9 oz. per ton at the present price of 22d. (47.5c.) per oz. Treatment costs are $2.30 per long ton, including a stiff cost of fuel oil and water.

Mr. Ives has lately introduced air drills (at 10,000-ft. elevation), and is cutting even his present low mining costs.

The mine has been worked for ores rich enough to stand the cost of amalgamation, and on that basis was worked out. The success of Mr. Ives' cyanide plant means a greatly prolonged life, and there is no reason why the plant cannot be considerably increased in capacity, with corresponding increase in profits, except the present price of silver. Undoubtedly as soon as the war is over this increase will be considered.

The most important gold mine, from the present profit point of view, is the Mina Miles, belonging to Don Felipe Herrera and operated by Felipe Herrera, Jr. The mine has been an intermittent producer for years, but until the last 18 months has been shut down and full of water. About a year ago Señor Herrera bought a boiler, sinking pump and Tremain steam stamp, and got going with a small amount of money. At present he is taking out of the Tremain an average of $100 per day and is preparing to ship high-grade pyritic ore which cannot be amalgamated. This shipping ore will average about 3 oz. and will be sent to England. The cost, including the commission of the shipping house, which advances against the value of the ore, is around 10% on this grade. The ore cannot be shipped to the States under similar conditions, and this is curious. Perhaps details will be interesting.

The miner samples his ore, assays it and ships it to the London address of the buyer or intermediary. He sends the shipping papers, together with his own assays, to the Valparaiso office of the consignee, who advances 90% of the value of the shipment.

The ore, concentrate or precipitate, or a combination

Las Vacas Stamp Mill

Mina Miles, at Talca

*Mining engineer, Huerfanos 1157, Santiago, Chile.

of these, reaches London, is sampled by an umpire and assayed, and is either offered for sale or a bargain may have been made upon a fixed tariff, after which regular shipments are made. In due course the returns come in, and the balance either way is adjusted. I have made numerous shipments from Condoriaco of precipitate, concentrates and ores of gold and silver, and invariably under the above-cited arrangement, though we have tried to make similar arrangements to ship to the States unsuccessfully.

The gold mine with the most complete equipment is Las Vacas. The mine is near the port of Los Vilos and has had its ups and downs during a hundred years, old iron tools of the early Spaniards being found occasionally. The old records of the mine production are quaint and interesting and make an attractive basis for reorganization proceedings and propaganda when the mine falls into bad ways. At present it is being operated on a systematic and intelligent basis, an addition having been made recently to the plant and considerable development being done in the mine.

The manager is Don Juan E. Garnham, who, while not professing technical knowledge, is a business man of long experience. He has had the good fortune to get around him three skilled men. H. C. Marret of Australia is mine captain and has done much needed development and preparatory work in the mine, has increased the drilling equipment and is putting the mine on a basis to produce regularly. This work has required a heavy expenditure for timbering, as many fills needed supporting before they could be drawn. These fills, of what was formerly considered waste, will be treated by the modern and complete cyanide plant which is now in running order. The ore is a hard quartz, with a percentage of pyrite, which is concentrated out. The plant is equipped to cyanide the concentrate; but the cost of shipping is so low that unless a high extraction on the concentrate can be made, the concentrate will no doubt be shipped to England.

James S. Anderson, an experienced cyanider, formerly with John Taylor, is in charge of the plant. The plant, while it has a capacity for only 40 tons per day of 24 hours, is the most complete and efficient in South America. Briefly, it consists of stamps, Dorr classifier, tube mill, Isbell vanners, Dorr thickener for slime, air agitation for slime and concentrate and vacuum filter. The stamps mill in water and amalgamation is effected in the mortar, on the battery plates and on tube-mill plates.

The battery is composed of five 900-lb. stamps purchased years ago and five 1250-lb. stamps which have just been erected. With the tube mill doing its fair share of the grinding and using coarse screens on the battery Mr. Anderson will have no difficulty in getting 4 tons per stamp, and may exceed that figure.

The consulting engineer of the company is E. David Pope, an Australian mining engineer of experience and ability. He has been in charge of the remodeling and addition of machinery, including the stamps, compressor and power equipment, and together with Mr. Marret has radically changed the system of mine development, and has found ore, the existence of which was not known.

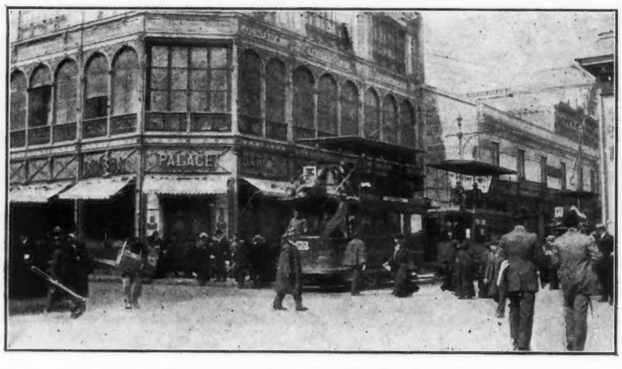
Taken altogether, the company has every facility upon which to base a hope of immediate and long-continued success.

The Loma Blanca mines near San Felipe, south of here, is also a mine with a long and at one time excellent record. A few years ago a 20-stamp mill was erected to amalgamate the ores, but was run for a short time only. An accident to the mill engine stopped work, and for some reason the plant was never started again. Recently another company has taken a long lease on the mine and mill, has repaired the plant and is now milling ½-oz. ore, amalgamating only.

There are two factors which have lately become of importance to gold and silver miners in Chile, and which must be taken into account, though it seems a cold-blooded thing to do.

The first is that, due to the stoppage of the nitrate plants, there is an enormous excess of labor. This labor must exist and is willing to work for anything offered. While few companies are taking any unfair advantage of the situation, new enterprises are starting on a much lower wage basis than was paid formerly.

The second point is a corollary of the nitrate disaster, since on account of the lessened shipment of nitrate (which pays export duty) the government income is low, and consequently the value of the paper money has dropped. This means that at the same time that less wages are paid the gold and silver produced buys more



A Street Corner in Santiago

paper money than formerly. This may or may not be a permanent condition. The exchange of the country has been dropping steadily for years, and as the general public fears for the credit of the country if the war is long, the value of the paper money will certainly not increase. The country is in able and honest hands, so far as the government is concerned; and as many of its public men have held office—more, in proportion, perhaps, than in other countries—it is certain that the ultimate result will be for the good of the government finances.

In any case, conditions could be a great deal worse, if comparisons are made with other countries; and as the agriculturist has a bumper crop under harvest it is almost safe to say that this is the most favored of all American countries. If only there were more mines operating or developing it would be possible to advise an immigration of miners and metallurgists. As it is, the only man who has an opportunity here is the one with capital, even if it is not very large, and he has an excellent opportunity. There are many small prospects that I know of personally (and quite likely others that I have not seen) that will warrant a speculation. This is not a general invitation to all American capital out of a job, as the country would be crowded with one steamer load.

The import duty on mining machinery is only 5%, and

is kept low as a special inducement to the mineral industry. There are a few small machine shops in the country, but none of them would attempt to build a cyanide plant, a concentrator or a smeltery. The freight from New York to the Coast is much less than that from Chicago to Goldfield, for example, and with few exceptions the mining districts are less than 100 miles from the port. All of the foregoing facts mean that with cheap and excellent labor, cheap living expenses, low freights and duties and short hauls, the conditions are ideal for mining investments. It should perhaps be recalled to the reader that Chile is long and narrow. The Longitudinal Ry. has lately been completed, and this runs north and south practically through the length of the country. Compared to railway rates elsewhere, its rates both for ore and for machinery are moderate.

Throughout the mining districts of Chile the climate is excellent the year round. If you will think of Los Angeles' climate, with the hottest days left out in summer and with a more reasonable amount of rain in the winter, it will give an exact impression of the climate where the mines are in Chile. As soon as generalizations are made it is necessary to indicate the exceptions. The climate at Braden is cold in winter, and at Chuquicamata and on the nitrate fields the summers are very hot.

Until very recently the foreign technical man could see no competitors ahead of him among the Chilean University men. The rooted prejudice against "doing things" made it always necessary to call for outside help when serious work was projected. This condition is changing, and now there are Chileans in charge of important mining and nitrate plants who not only know the theory of their jobs, but are able intelligently to supervise the details. I could make this paragraph very interesting if it were permissible to indulge in personalities. It is interesting to record that we have lately had numerous applications from university students for positions where they can begin at the bottom and work up. To one who has lived in Mexico or Central America this will be noteworthy, as it certainly requires a strong determination on the part of the young man to force him to work as a peon at the beginning, against the wishes, usually, of his father, mother, brothers and sweetheart.

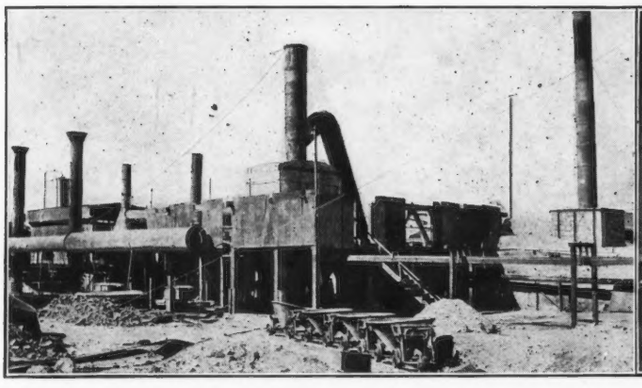
In the south of Chile there are placer deposits of gold which have been reported upon favorably and otherwise. I have no first-hand knowledge of them, except that none is being worked on a large scale. At one time a number of dredges were built and failed, and the gold is still there. The usual small lots are brought in by the Indians, but whether they would pay to work in the California way is a question.

The accompanying illustrations will give a good idea of some of the districts, but the local conditions can only be known by investigating them. Even then we might not agree.

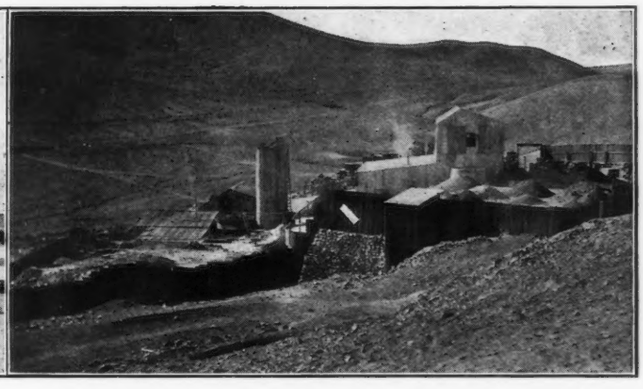
The reader will remember that once upon a time Chile was the largest producer of copper. The districts are still here; and as lower grades of ore can be treated profitably, there are still opportunities in copper mining. Americans are here now, even during these hard times for copper, making drillings and taking options on likely properties.

The Andacollo copper mines offer one example of a property that has produced copper for a long time and which has not yet found a buyer. Just now it is in liquidation and would be an opportunity for someone who thinks he can see into the ground. It has been drilled and sampled carefully and rejected by one American company, but the price might have had something to do with the final results.

A large smeltery has lately been built at Guayacan to replace with blast furnaces the usual reverberatory furnaces of Chile. This plant at Guayacan was built mainly as a custom plant and was on the way to success when the market for copper dropped.



COPPER SMELTERY AT CALAMA



MILL AND CYANIDE PLANT AT CONDORIACO

All but one of the blast furnaces in Chile have basic converters, and this one would have had the basic equipment if the results attained by shipping matte were not better in that particular case than by converting.

Even a set of small, hand-operated converters have been lined with basic brick, and with no other change except the lengthening of the tuyeres is making copper as successfully as the large plants.

Taking everything into consideration, Chile is a fine place to live in at present. The people pay their debts, the laborers give more in proportion to the money they receive than elsewhere on account of the low value of the money, the mines can be operated without any adverse conditions and the government is secure. The only objection to the country—and it is a serious one—is that it takes 23 days to reach New York. If it were possible to land freight and passengers here as quickly as in Nevada, it would be ideal, since what this country lacks could be easily obtained in New York.

Crude Borate Production for 1913 in the United States amounted to 58,013 tons, all of which comes from Inyo, Los Angeles and Ventura Counties, Calif., according to the U. S. Geological Survey. In addition 435,315 lb. of miscellaneous refined borax products were imported.

Status of Alaska Coal Land Leasing

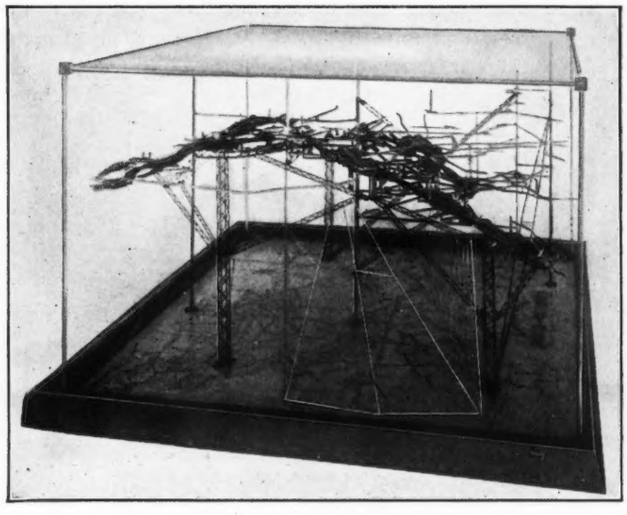
Secretary Lane said recently that he was receiving a great many inquiries with respect to the date when operations could be commenced under the Alaska coal-leasing act, passed at the last session of Congress, and that evidently the provisions of the law were not generally understood, especially with respect to the several preliminary steps necessary to be taken before the coal lands of the territory could be properly offered as subject to lease. He called attention to the fact that under the statute he is directed to survey the coal lands in the territory, with preference given to the Bering River, Matanuska and Nanana coal fields, such surveys to be executed in accordance with existing laws, rules and regulations governing the survey of public lands, with permission to adopt and use any surveys heretofore made under the authority and approval of the Department; that before any lands are offered for leasing the President of the United States is required to designate and reserve from use, location, sale, lease or disposition not exceeding 5120 acres of coal-bearing lands in the Bering River fields and not exceeding 7680 acres of coal-bearing lands within the Matanuska fields. The unreserved coal lands are thereafter to be divided by the Secretary into leasing blocks or tracts of 40 acres each, or multiples thereof, in such form as will permit the most economical mining of the coal in such blocks, but in no case exceeding 2560 acres in any one leasing block or tract. The lands having been thus divided into leasing blocks, the Secretary under the act is then authorized, and not before, to offer such blocks or tracts for leasing, and award leases thereof through such plan as he may adopt, either by advertisement, competitive bidding or otherwise.

It is therefore apparent that until such time as the surveys have been extended over the coal fields, with a full report as to the extent and location of the coal deposits therein, he will be unable to divide the lands thus surveyed into leasing blocks or tracts, in such form as to secure the economical mining of the coal, a duty which is specially imposed upon him by the statute. He said, however, that it was his intention to expedite the work in every way consistent with securing the proper data upon which to base his subsequent action, and to that end parties were already on their way to the field. He also expressed the opinion that it would not be necessary to await the return of the surveys in order to declare the reservations required by the statute, as existing approved surveys could be used for that purpose, subject to such adjustment as might later be required under the survey now being made. These reservations will be announced at an early date, and thereafter parties interested in the Alaska coal fields will have opportunity to make such personal inspection of conditions as they may desire, and thus acquire such knowledge as will enable them to consider leasing propositions when the lands are finally offered to the public for such purpose. The extent of the work in the field, the shortness of the Alaska season, and other matters considered will not permit the opening of these lands to leasing until the beginning of the season of 1916, but prior thereto ample notice will be given, through the papers and otherwise, of the plan by which these lands will be opened to leasing, with such other information in connection therewith as may then seem appropriate.

Mine Models in Tonopah Apex Litigation

In the recent litigation between the West End and Jim Butler, in Tonopah, a mine model was exhibited to the court in which all of the workings were represented by square copper wire, which could be easily bent to conform to the courses of the drifts. The stopes were carved from wood. The workings were supported on slender columns over a base, on which was shown the usual mine map, with all of the workings superimposed. The model was inclosed by glass sides and a glass top.

During the trial it was necessary to refer to three surfaces of the earth over the territory where the vein in dispute now is: The present surface; the surface that existed just before the materials which form the present surface were deposited; and the surface which existed prior to the erosion which left this latter surface. For the benefit of the court, a block model was prepared, showing the contour of the ground as at present. Lifting off the top block of this model left the model showing the surface as it was



TONOPAH MINE MODEL

before the material which forms the present surface was deposited; and lifting off still another block showed the surface which existed prior to the erosion.

Tin Output of Siam Increases

A feature of the tin-mining industry which centers around the Straits is the increased production obtained from Siamese Malaya and Siam itself, says the London *Mining Journal*. For the last financial year, 1913-1914, eight dredges were at work, which produced black tin yielding 1800 tons of metal from 4,700,000 yd. of gravel treated. This number has been added to since, and there are now 13 dredges at work and more are under construction. Apart from the dredging industry, the output of metal would probably show a declining tendency. The output for the last four years in metal is as follows: 1910-1911, 4900 tons; 1911-1912, 5900; 1912-1913, 6600; 1913-1914, 6800 tons.

The Mineral Production of South Australia in 1913 was as follows, the items being arranged in order of descending value: Copper, 7161 tons; iron ore, 60,658 tons; gold, 6556 oz.; limestone, 44,300 tons; phosphate rock, 5950 tons; silver, 2660 oz.; silver-lead ore, 153 tons; all else, £68,909.

Indexing and Filing Technical Literature

By Alvin R. Kenner*

SYNOPSIS—When stripped of frills and unnecessary time-consuming practices, filing pays. The system described is one which was devised and used for seven years by a mining engineer for mining needs. Superiority of the topical system over others and the weakness of the Dewey system are shown.

The great majority of mining engineers, especially those technically trained, have considered the filing of technical information. A smaller percentage, though still a majority, have started a technical file, but the number of those who have followed the practice for any length of time is comparatively small.

The two most potent reasons for this latter condition are the adoption of a poor system and the comparatively small benefit derived at the beginning.

Anyone who weighs the advantages and disadvantages of a technical file during its first year or so will probably come to the conclusion that filing is a delusion and a snare. Adding to this the probability of a poor system, which entails a correspondingly greater amount of work, the average engineer is apt to dismiss the idea for all time as theoretically feasible but economically impossible.

Filing, like anything else, can be carried to extremes. In too many cases it becomes a fad. Much clipping, folding, pasting, cross-referencing and general fussing are indulged in, and all sense of an economical expenditure of time is lost sight of. However, when stripped of all unnecessary frills and close attention is paid to every means of reducing the time and tediousness involved, the practice is to be commended and will well repay the time expended.

Filing is practiced more extensively in other lines of engineering than mining, yet there is no field of engineering so varied, so progressive or more in need of the practice. Not to file is to lose the greater part of the benefit to be derived from technical periodicals.

A technical file is properly divided into: (1) The index or key, which is used in marking or referring to articles, and (2) the file, in which the articles are kept for future reference.

Methods of Indexing

All methods of indexing are included in some one of the following systems: Alphabetical—as in the semi-annual index of the Engineering and Mining Journal; combined alphabetical and topical—as in the monthly Mining Index of the Engineering and Mining Journal and Crane's *Index of Mining Engineering Literature;* topical—as in the Dewey decimal classification, which is largely used by libraries.

Of these methods the topical is the best for the individual's use. The most widely known example of this is the Dewey system, which is an attempt to divide the world's knowledge topically. Although such attempts have been made from the time of Lord Bacon to the present day, Melvil Dewey was the first to work out a classification sufficiently meritorious to warrant its general adoption.

Defects of the Dewey Classification for Mining Literature

The Dewey classification is a most excellent one for libraries, for which purpose it was primarily devised, but is not adapted to the individual's use, although frequently employed. The principal objections are as follows: The headings pertaining to mining engineering, when considered separately from the rest of the classification, are not logically arranged from the engineer's point of view.

The original Dewey classification was published in 1876, since which time the progress in mining has been most notable. Naturally a classification made 40 years ago will not adequately meet present needs, even though considered from an equal-value-to-all-knowledge basis. Considered from the particular viewpoint of the mining engineer—to whom, when filing, all knowledge other than mining must be subordinate—the arrangement is far from satisfactory.

The author of the Dewey classification has encountered difficulty in satisfactorily expanding the subject of mining engineering because its headings covering this industry are not properly subdivided. While extensive subdivision is not of much importance in filing books, it is most important in the case of articles; otherwise the labor of both filing and finding them is greatly increased.

The adoption of the Dewey classification in order to obtain conformity with the system used in libraries is apt to prove a disadvantage rather than an advantage. To maintain a private file in conformity with the Dewey classification is impossible. If used for filing articles it must be more extensively subdivided. Any subdivisions made by the engineer are not likely to correspond with future expansions by Dewey.

The advantages of following the Dewey classification are more imaginary than real, anyway. In many libraries only the alphabetical and not the numerical, or topical, catalog is open to the public. Furthermore, the library staff (usually feminine) develops strange ideas regarding engineering subjects; and though mistakes are compensated for in the alphabetical catalog by exhaustive cross-referencing, they cannot be avoided in the numerical catalog. The cataloger of one important Western library has placed metallurgical books under *mining engineering* instead of under *chemical technology,* where Dewey intended them to be placed. This and similar changes will prove disastrous where dependence is placed on a knowledge of the Dewey system. The contents of technical journals are not indexed by libraries according to the Dewey system, and it can only be used in referring to books, which are as readily found in the alphabetical as in the numerical catalog.

A further disadvantage of the Dewey classification in a private file is the increased amount of cross-referencing.

*General superintendent, Rio Plata Mining Co., Guazapares, Chihuahua, Mexico.

due to the illogical order. It offers no advantages to offset all these drawbacks.

Individual Classifications Preferable

An original classification drawn up to conform with the individual's need and viewpoint will prove the most satisfactory in the end. In such a classification the headings should be arranged in a sequence logical enough so that the position of every heading can be readily recalled.

Any attempt to use a ready-made classification is likely to prove unsatisfactory, not only because of a difference in the point of view but also on account of the emphasis placed on some subjects as compared to others. Suggestions, however, may be obtained from other classifications. To illustrate the principle involved in topical indexing, a classification is given below which I have used for seven years.

No attempt has been made in this classification to divide the entire subject of mining engineering into its theoretical subdivisions. The subject is viewed from the standpoint of the metal miner, and therefore not enough importance is given to coal and nonmetallic products. Placer mining and the fire-metallurgy of metals have not been expanded because of my limited requirements in those lines.

The avoidance of cross-references has been an important factor in governing the grouping of headings. For example, bucket-dumping headframes and buckets, skip-dumping headframes and skips, etc., are grouped, as they are interdependent and frequently described in the same article. If any article treats of two or more subdivisions—such as a comparison of the efficiency of steam and compressed air in hoisting—it is filed under the nearest main division (in this case 141-11), thus avoiding the necessity of cross-referencing.

Such subdivisions as "Silver only" (351-1), "Shaft plumbing" (183-11) and similar single subdivisions are used because sufficient articles on these subjects were accumulated to warrant separate subheadings; while there were so few articles on the remaining possible subheads that they may all be conveniently filed under the one head. While extensive subdivisions are advisable from the start, nothing is gained, and the index is unduly lengthened by carrying expansion to extremes. Aside from placer mining and fire-metallurgy, the classification given is as completely subdivided as the average engineer requires.

Any such outline as here given appears disjointed and almost meaningless unless an attempt is made to draw up a similar one. Words must be used where phrases are necessary to express the scope of each heading, and in many cases better words might possibly be chosen. However, the relative positions in the outline, as much as the words themselves, serve to indicate the ground covered by each heading.

Classification

1 **MINING**
11 **Prospecting** (11)
111 SURFACE, MAGNETIC SURVEYS (111)
112 UNDERGROUND, BORE-HOLE DRILLING (112)
.1 Metal and Coal (112-1)
.2 Oil (112-2)
12 **Mine Examination and Report** (12)
121 MINE SAMPLING (121)* (including mine dumps)
123 FORM OF REPORT (123)
125 MINE VALUATION (125)
13 **Winning or Breaking Ore** (13)
131 SYSTEMS OF BREAKING GROUND (131)
132 BREAKING GROUND (132)
.1 Drilling (132-1)
.11 Compressed-Air Drills only (132-11)
.12 Other Machine Drills. Hand-Operated Drills (132-12)
.13 Placing and Gaging Holes. Setting Up (132-13)
.19 Drill Steel. Sharpening, Tempering, etc. (132-19)
.2 Blasting (132-2)
.21 Composition of Explosives (132-21)
.22 Storing and Thawing of Explosives (132-22)
.23 Crimping. Tamping. Spitting (Caps. Fuse) (132-23)
.25 Electric Shot Firing (132-25)
.3 Mucking (132-3)
133 TIMBERING AND METHODS OF HOLDING GROUND (133) IN
.1 Shafts (133-1)
.11 Solid Ground (133-11)
.12 Running Ground. Excessively Wet Ground (133-12)
.2 Drifts. Cross-cuts. Tunnels (133-2)
.3 Stopes (including Sand Filling) (133-3)
.4 Raises (133-4)
.8 Preservation of Mine Timbers (133-8)
.9 Substitutes for Mine Timbers (133-9)
14 **Handling Ore** (14)
141 HOISTING (141)
.1 Hoists (141-1)
.11 Motive Power (141-11)
.111 Steam (141-111)
.112 Electricity (141-112)
.113 Compressed Air (141-113)
.12 Hoisting Engines (Geared. First Motion, etc.) (141-12)
.18 Counter Balancing (141-18)
.19 Koepe and Whiting Systems (141-19)
.2 Head Frames and Dumping (141-2)
.21 Bucket Dumping Frames and Buckets (141-21)
.22 Skip Dumping Frames and Skips (141-22)
.23 Cage Head Frames and Cages (141-23)
.29 Interchanging Skips and Cages (141-29)
.3 Safety Devices (141-3)
.31 Cage Guide Catches (141-31)
.32 Bucket Cross-heads and Catches (141-32)
.33 Overwinding (141-33)
.35 Landing Chairs (141-35)
.36 Gage Gates. Shaft Gates and Coverings (141-36)
.4 Ropes and Cables. Care. Strains (141-4)
.5 Signaling and Communication (141-5)
.51 Electrical Signaling (141-51)
.52 Non-Electrical Signaling (141-52)
.58 Mine Telephones (141-58)
.59 Signal Codes (141-59)
142 HAULAGE (142)
.1 Systems (142-1)
.11 Electrical (142-11)
.12 Compressed-Air (142-12)
.13 Gasoline. Mules. Man (142-13)
.18 Endless Rope and Tail Rope Haulage (142-18)
.2 Trackage. Dumping (142-2)
.21 Trackage. Switches. Turntables. etc. (142-21)
.22 Dumping (142-22)
.221 Mechanical Dumping and Cars (142-221)
.222 Other Methods of Dumping and Cars (142-222)
.23 Inclined Planes (142-23)
.231 Gravity (142-231)
.232 Other than Gravity (142-232)
143 AERIAL TRANSPORTATION (143)
.1 Cableways and Overhead Tramways (143-1)
.11 Gravity Operated (143-11)
.12 Power Operated (143-12)
.2 Traveling Bridges and Cranes. Loaders (143-2)
.9 Conveyors (143-9)
144 CROSS-COUNTRY (SURFACE) TRANSPORTATION. ROADS (144)
.1 Hauling (144-1)
.2 Packing (144-2)

*For the sampling of placers see (39). For the sampling of bedded ores or tailings see (319-7). For the sampling of ore lots or mill flow see (319-8).

145 SURFACE ARRANGEMENTS FOR ORE HANDLING. SORTING (145)
.1 Sorting (145-1)
.2 Surface Bins. Ore Gates or Chutes (145-2)
15 **Ventilation** (15)
151 FANS. BLOWERS (151)
152 FURNACE. STEAM JETS. HYDRAULIC, ETC. (152)
156 MEASUREMENT AND TESTING OF AIR (156)
16 **Drainage** (16)
161 PUMPING (161)
.1 Steam Installations (161-1)
.3 Electrical Installations (161-3)
.4 Air Lift Installations (161-4)
.8 Cornish Pumps (161-8)
.9 Miscellaneous (161-9)
162 HOISTING WATER (162)
163 LESSENING INFLOW. REDUCING AMOUNT HANDLED (163)
.1 Dams. Watertight Linings. Cementing Channels (163-1)
.2 Water Rings (163-2)
18 **Surveying** (18)
181 SOLAR OBSERVATIONS. ADJUSTMENT OF INSTRUMENTS, ETC. (181)
182 SURFACE SURVEYS (182)
.1 Claim Surveying (182-1)
.2 Topographical Surveying (182-2)
.3 Other Surface Surveying. Reconnaissance Surveys (182-5)
183 UNDERGROUND SURVEYS (183)
.1 Mine Workings (183-1)
.11 Shaft Plumbing (183-11)
.2 Bore Holes (Surveying only) (183-2)
2 **GEOLOGY OF MINING** (2)
21 **Mineralogy** (21)
211 CRYSTALLOGRAPHY (211)
212 BLOW-PIPING (212)
213 MINERALS (213)
22 **Lithology** (22)
221 MICROSCOPICAL PETROGRAPHY (221)
222 ROCKS (222)
23 **Paleontology** (23)
24 **Physical and Dynamical Geology** (24)
241 PHYSICAL GEOLOGY (241)
243 STRUCTURAL GEOLOGY (243)
.1 Outcrops. Surface Indications of Ore Shoots (243-1)
.2 Faulting (243-2)
.3 Anticlines and Synclines (243-3)
.7 Dikes. Intrusion of Eruptives (243-7)
249 GENERAL SUGGESTIONS FOR GEOLOGICAL WORK. TOOLS. FIELD EQUIPMENTS, ETC. (249)
25 **Economic Geology** (25)
251 THEORIES OF ORE DEPOSITION. CHEMISTRY OF PROCESS (251)
255 OCCURRENCE OF (255)
.1 The Metals (255-1)
.11 Gold and Silver (255-11)
.111 Gold only (255-111)
.112 Silver only (255-112)
.12 Copper (255-12)
.13 Lead and Zinc (255-13)
.14 Iron (255-14)
.19 Other Metals (255-19)
255
.2 The Nonmetals (255-2) (Genesis also)
.21 Coal (255-21)
.22 Petroleum (255-22)
.23 Diamonds (255-23)
.24 Other Gems (255-24)
26 **Geographical Geology** (26)*
261 NORTH AMERICA (261)
262 SOUTH AMERICA (262)
3 **CONVERTING ORES INTO MARKETABLE PRODUCTS** (3)
31 **Ore Dressing. Individual Operations** (31)
311 COMMINUTION (311)
.1 Theory, Laws of (311-1)
.2 Crushers (311-2)
.3 Rolls (311-3)
.4 Stamps (311-4)
.5 Tube-Mills. Ball-Mills (311-5)
.7 Roller Mills (Huntington, Chilean, etc.) (311-7)
.8 Arrastras. Pans (311-8)
.9 Miscellaneous (311-9)
312 SIZING (312)
.1 Screening (312-1)
.2 Hydraulic Classifiers (312-2)
.21 Laws of Classification (312-21)
313 JIGGING (313)
.1 Theory, Laws of (313-1)
.2 Jigs (313-2)
314 CONCENTRATION (TABLES, VANNERS, ETC.) (314)
.1 Theory. Laws of (314-1)
.2 Sand (314-2)
.3 Slime (314-3)
315 THEORY, LAWS AND MACHINES OF OTHER OPERATIONS (315)*
.1 Magnetic (315-1)
.2 Electrostatic (315-2)
.3 Flotation (315-3)
.4 Pneumatic (315-4)
317 ACCESSORY MILL APPARATUS (317) (Elevators, Weighing Devices, Automatic Feeders, Driers, Etc.)
319 MISCELLANEOUS MILLING (319)
.1 Construction of Mill Buildings (319-1)
.2 Ore Testing. Increasing Extraction (319-2)
.5 Disposal and Storage of Tailings (319-5)
.7 Sampling Bedded Ores, Slimes, Tailing (in place) (319-7)
.8 Sampling Ore Lots or Mill Flow (319-8)
.81 Hand only (319-81)
.82 Machines (319-82)
.9 Miscellaneous Information (319-9)
32 **Mill Flowsheets. Combined Operations** (32)
321 GOLD AND SILVER ORES (321)
.1 Lixiviation only (321-1)†
.11 Sand and Slime (321-11)
.12 All Sliming (321-12)
.2 Concentration and Lixiviation (321-2)
.21 Cyaniding (321-21)
.211 Tailing only (321-211)‡
.1 Sand and Slime (321-211-1)
.2 All Sliming (321-211-2)
.22 Chlorination (321-22)
.9 Refractory Au and Ag Ores (321-9)§
.91 Containing As and Sb (321-91)
.92 Containing Tellurides (321-92)
.93 Containing Manganese (321-93)
.94 Containing Copper (321-94)
322 SILVER AND SILVER-LEAD ORES (322)
.1 Silver (Cobalt) (322-1)**
.2 Silver-Lead (Idaho) (322-2)
323 LEAD-ZINC-COPPER ORES (323)††
.1 Silver-Lead and Zinc (British Columbia; Broken Hill) (323-1)
.2 Gold,‡‡ Silver, Lead and Zinc (Colorado) (323-2)
.3 Lead and Zinc (Wisconsin; Joplin) (323-3)
.5 Lead, Zinc and Copper (323-5)
324 COPPER AND COPPER-PYRITE ORES (324)
.1 Gold, Silver and Copper (324-1)
.2 Copper only (native; Lake Superior) (324-2)
.6 Copper-Iron Sulphide (Eastern States) (324-6) (no precious metals)
.8 Pyrite (324-8)
325 IRON (and manganese) ORES (325)
329 MISCELLANEOUS ORES (329)
.1 Tin (329-1)
.2 Tungsten (329-2)

*General descriptive articles and laws of foreign countries can be marked "General" and "Law" and conveniently filed under subdivisions of this heading.

*Note that these are operations depending upon purely physical properties of the ore. Descriptions of mills using these processes go under (32); the theory and the description of single machines are included here.

†Cyaniding, chlorination, etc.

‡Flow sheets of mills cyaniding both concentrate and tailing are filed under (321-21)

§Refractory ores, involving more than simple lixiviation and concentration, in which the gold and silver values are the important minerals; but extraction is complicated by small amounts of the metals mentioned.

**Typical districts are mentioned after some of the headings to give a clearer idea of their meaning.

††Ores containing two or more of these three metals.

‡‡Gold generally indicates the presence of and the necessity for saving some carrier such as iron pyrite. The precious metals—gold and silver—although only recovered indirectly through carriers, yet influence the treatment and extent to which the recovery of sulphide can be profitably carried. For example, the absence of gold and silver in the Wisconsin and Joplin districts means a lower percentage of extraction and a corresponding difference in mill design from that encountered in Western lead and zinc districts where precious metals are found.

33 **Metallurgy of** (33)
331 GOLD AND SILVER (331)
.1 Amalgamation (331-1)
.2 Chlorination (331-2)
.3 Cyaniding (331-3)
.31 Chemistry (331-31)
.32 Sand Treatment (331-32)
.33 Slime Treatment (331-33)
.331 Agitation (331-331)
.332 Filtering (331-332)
.1 Vacuum (331-332-1)
.2 Pressure (331-332-2)
.336 Settling Slimes, Slime Thickeners, etc. (331-336)
.1 Decantation, Intermittent (331-336-1)
.2 Continuous Decantation (331-336-2)
.7 Types of Slime Thickeners (331-336-7)
.9 Lime and other alkalies (331-336-9)
.35 Zinc Room (331-35)
.351 Precipitation (331-351)
.1 By Zinc (331-351-1)
.11 Shavings (331-351-11)
.12 Dust (331-351-12)
.2 Other Methods (331-351-2)
.352 Clean-Up and Melting (331-352)
.353 Refining Bullion (331-353)
.37 Miscellaneous (331-37)
.372 Electro-cyaniding (331-372)
.373 Cyaniding Stored Tailings (331-373)
.375 Cyaniding Concentrates (331-375)
.4 Other Processes (Leaching, etc.) (331-4)
332 COPPER (332)
333 LEAD (333)
334 ZINC (334)
337 IRON (337)
338 OTHER METALS (338)
339 MISCELLANEOUS (339)
35 **Chemical Analysis and Assaying** (35)
351 GOLD AND SILVER (351)
.1 Silver only (351-1)
352 COPPER (352)
353 LEAD (353)
354 ZINC (354)
357 IRON (357)
358 OTHER METALS (358)
359 MISCELLANEOUS (359)
.2 Laboratory Equipment (359-2)
.21 Assaying only (359-21)
.22 Chemical only (359-22)
39 **Placer Mining** (39)
4 **MARKETING PRODUCTS** (4)
5 **FINANCING** (5)
6 **MISCELLANEOUS** (6)
61 **Office. Administration** (61)
611 MANAGEMENT. ORGANIZATION (611)
.1 Military Type. Departments (611-1)
.2 Task Management. Taylor-Gantt Methods. Gilbreth (611-2)
612 LABOR (612)
.1 Peculiarities and Customs of Different Classes (612-1)
.2 Wage Systems (612-2)
.5 Welfare Work, Sick and Death Benefits, Clubhouses and Hospitals (612-5)
613 BOOKKEEPING (613)
.1 Mine and Mill (613-1)
.2 Smelter (613-2)
.5 General Bookkeeping. Graphic Methods, etc. (613-5)
614 ENGINEERING RECORDS. MAPS. MINE MODELS (614)
.1 Drafting (614-1)
.11 Mine Maps (614-11)
.15 General Drafting Hints (614-15)
.2 Mine Models (614-2)
.5 Systems of Recording and Filing Engineering Records (614-5)
617 GENERAL MINING AND METALLURGICAL COSTS (617)*
63 **Law** (63)
631 MINING (U. S. only) (631)†
.1 Title to Mining Lands (631-1)
.2 Contract Forms (631-2)
.5 Liability for Debts and Injuries (631-5)
632 METALLURGICAL (632)
65 **Power, Etc.** (65)
651 POWER PLANTS (651)
.1 Steam (651-1)
.11 Engines. Types. Care and Efficiency of (651-11)
.12 Boilers (651-12)
.121 Firing (with Wood, Coal, Oil or Gas) (651-121)
.122 Boiler Scale. Feed Water Purification (651-122)
.123 Condensers, Injectors, Superheaters, Separators, etc. (651-123)
.124 Boiler Testing. Recording Instruments (651-124)
.13 Steam Distribution and Transmission (651-13)
.131 Laws of Flow. Condensation. Friction in Pipes (651-131)
.132 Piping and Connections (651-132)
.133 Utilization of Exhaust Steam (651-133)
.2 Gas and Oil (651-2)
.21 Gas Producer Plants (651-21)
.22 Gasoline and Oil Engines (651-22)
.3 Hydro-Electrical (651-3)
.31 Water (651-31)
.311 Measurement of Water Flow. Hp. Calculations (651-311)
.312 Flume Lines, Ditches, Large Pipe Lines (651-312)
.313 Dams (651-313)
.316 Water Wheels. Hydraulic Motors (651-316)
.32 Electrical (651-32)
.321 Generators (651-321)
.322 Motors (651-322)
.325 Transmission. Wiring (651-325)
652 MECHANICAL TRANSMISSION OF POWER (652)
.1 Shafting, Bearings, Journals, Clutches (652-1)
.2 Toothed Gears and Cams (Chain Gearing) (652-2)
.4 Machinery and Mill Gearing (652-4)
.41 Belt Transmission (652-41)
.42 Rope (hemp and wire) Transmission (652-42)
.43 Pulleys. Sheaves (652-43)
.44 Friction. Gearing. Direct Connection (652-44)
.9 Lubrication. Lubricants. Friction (652-9)
653 AIR COMPRESSION (653)
.1 Air Compression Plants (653-1)
.11 Mechanical. Precooling (653-11)
.12 Hydraulic (653-12)
.2 Compressed Air Transmission. Reheating. Storage (653-2)
69 **Miscellaneous**
691 ACCIDENTS AND DISEASES (691)
.1 Diseases (691-1)
.2 Poisoning (691-2)
.3 Electrical Accidents (691-3)
.4 Explosion of Mine Gases (691-4)
.5 Mine Fires. Sealing and Flooding Workings (691-5)
.6 Helmets and Hoods (691-6)
692 ILLUMINATION. LIGHTING (692)
693 BLACKSMITHING. REPAIRING MACHINERY (693)
694 CONCRETE WORK. MACHINERY FOUNDATIONS (694)
698 UNCLASSIFIED (698)
699 COAL (699)
.1 Mining (699-1)
.2 Cleaning and Washing (699-2)

*The costs of individual operations, such as crushing, filtering, pumping, etc., are filed under their corresponding headings. Only general costs are included here.
†Mining laws of foreign countries are marked "Law" and filed under the subdivisions of heading (26).

Explanation of This Classification

No attempt will be made to explain the reason for all the headings, but an explanation of the relation between the main divisions will give an idea of how a certain sequence connects them so that the relative position is readily recalled.

The primary divisions—Mining, Geology, Preparing Ores for Market, Marketing Products and Financing—are well-recognized divisions of mining and scarcely admit of any other arrangement.

In mining, prospecting is the first step. Following this, sampling and data such as are gathered in a mine examination are necessary to direct intelligently future operations, and if a prospect or small mine is to be extensively developed some kind of examination and report is usually required before the money for its exploitation can be obtained. Then follows the development or winning of the ore and its removal. Since ventilation, drainage and surveying may continually enter into consideration at any time, these three heads are placed last.

Geology of Mining begins with the subjects necessary for the study of ore deposits, followed by the heads covering the subject proper. The subdivisions under Geographical Geology are not given, as they can be readily supplied. In dividing the United States, division into states and these again into single districts will be found preferable to the plan used by the U. S. Geological Survey, mainly for the reason that the longitude and latitude of a district are not always given in technical articles.

In Converting Ores into Marketable Products first comes the consideration of the individual machines for ore-dressing, followed by mill flowsheets showing how the individual machines are combined to obtain the best results. When information along this line is desired it usually concerns a particular class of machinery, the laws governing its operation and its efficiency in comparison with other machines, or the combination of machines that will give the best results on a given ore—i.e., the flowsheets of modern mills or how similar ores are treated. The first information is found in (31) and the second in (32). The metallurgy of ores follows their dressing or preparation. Chemistry and assaying are accessory subjects, essential in Converting Ores into Marketable Products.

Placer mining might properly be considered as made up of both mining and the preparation of ores for market, and an attempt might be made to divide the subject between these two heads. However, the nature of all articles on placer mining is such that this plan would require a large number of cross-references and be unsatisfactory. Amalgamation, or at least the collection of gold on an amalgam plate, depends upon physical properties; but when it is remembered that the head includes retorting and the chemical actions of substances on plates and in pan amalgamation, it is not out of place under metallurgy.

The remainder of the classification, Marketing Products, Financing, and the miscellaneous headings Organization, Law, Power, Misc., are purely arbitrary in the general arrangement.

Methods of Filing

Three systems are commonly employed in filing technical articles—namely, vertical files, letter files and scrapbooks.

Of these, the first is undoubtedly the best. Scrapbooks involve an enormous amount of trimming, pasting and folding; while letter files necessitate folding, are cumbersome, bulky and cannot be sectionalized like a vertical file. Scrapbooks and letter files have been discarded so long ago by commercial organizations in a similar class of work that they do not deserve serious consideration.

Either an ordinary open-at-the-end folder or a tension envelope (closed at the ends, but without a flap) should be used. The latter is to be preferred, as it keeps its shape and permits articles to be filed more rapidly.* The legal-cap-size folder or envelope is preferable to a smaller size; the folding of articles is avoided.

Cross-Referencing

Under any system of filing cross-referencing is necessary. Much of it could be obviated by a little coöperation on the part of technical publishers. Cross-referencing, caused by poor arrangement in this respect, has discouraged a considerable number of engineers in efforts at filing.

There are four or five ways of cross-referencing in use, but 3x5 cards will be found much the best.† The cards should not be filed in the folders but kept separate in a 3x5 box or drawer.

General Suggestions

In writing the key number on articles a short dash every three numbers will assist in reading off the number readily.

The numerals corresponding to a cross-reference should be inclosed in parentheses to prevent confusion in filing. Pages bearing numerals referring to cross-references should be filed in the front of the folder and pages containing single articles in the back. In this way a cross-referenced article may be located in about one-fifth of the time usually necessary.

Articles that clearly belong under a certain minor heading, but do not fall within any of its present subdivisions, should be filed under that heading, and no special subheading made for them until a sufficient number have accumulated to permit intelligent subdivision. Articles that cannot logically be filed under any heading or subheading can be filed by a scheme similar to the relative index used in the Dewey classification. For 99% of articles, however, no relative index is necessary and is a waste of time.

If weight is an objection, the heavy pressboard guides, customarily used with legal size folders, can be dispensed with by placing adjustable index-tabs on some of the folders.‡

Although the number of headings in the classification or key may run into the hundreds, a very small number of folders may be used. As the number of articles increases the folders may be increased. A small arrow in red ink following the number on any folder will indicate that additional folders have been added for the subdivisions. The proper number for an article can be read off in a few seconds if inks of different colors are used to bring out the relative value of the headings and subheadings on the index. Two pieces of stiff cardboard at right angles, two small blocks of wood to hold them, and a weighted spindle will make a revolving stand that eliminates unnecessary handling of the index pages.

The Institut International de Bibliographie of Brussels has adopted six or eight symbols which are employed in a most ingenious manner.§ Their use is not advisable

*A folder manufactured by the Library Bureau of Boston, Mass. (No. 5219), is very satisfactory, although it holds more articles than the average heading requires.

†The Library Bureau, Boston, Mass., manufactures a conveniently ruled card (No. 33014) of durable light-weight stock.

‡A convenient tab is made by the Yawman & Erbe Manufacturing Co., of Rochester, N. Y. (Everlasting Index Tab No. 70).

§A full description of these symbols in English is given in a pamphlet entitled "A Systematic Code and Index of Electrochemistry and Allied Subjects (1906)," by Adolph Law Voge, of the Concilium Bibliographicum, Zurich, Switzerland. A brief description is given in the seventh edition (1911) of the Dewey Decimal Classification.

in an individual file, but they are interesting as showing how distinctions can be made when a large number of articles are filed, as in indexes of technical libraries.

It is not necessary to read all articles filed. Such a practice is based on the supposition that everything filed is referred to later, which is a fallacy. The title, synopsis and the beginning of one or two paragraphs are generally enough to determine the gist of an article, and also its value. If its merit is questionable, the first time it is read for reference it can be thrown out of the file. Technical journals should not be looked over and then laid aside for filing. With a pencil at hand, articles of no merit can be marked out, and it will save time to index articles worth saving at once. An extra 20 or 30 minutes should suffice to index the contents of any periodical.

The tedious part of filing—the tearing out of articles to be preserved, making out cross-reference cards and placing the articles in the file—can be left to any assistant of ordinary intelligence, if the topical system is used.

Does It Pay to File?

The main sources of information, aside from that gained through practical experience, are: (1) Books; (2) technical periodicals—(a) bound technical journals, (b) personal file.

While everyone makes use of the first source for the accumulated knowledge of the past, there is a difference of opinion among engineers as to whether bound volumes or a personal file can be used to greatest advantage in supplementing books. This difference of opinion, however, will often be found to depend upon an engineer's location and line of work. Situated in large cities, with adequate technical libraries and bibliographical indexes at hand, it is doubtful if the advantages gained will offset the time spent in filing. Theoretically, at least, it will not. But those who have hastened to a library to obtain information urgently needed, and spent hours, if not days, in a tedious search, realize that it is preferable to collect such information by degrees rather than exhaust the faculties in a wearisome and often fruitless search when they are needed for the problem in hand.

If years are spent in the same line of work in a district where the local practice is long established, filing offers few advantages, for such improvements as can be applied to the work in hand can usually be adopted at the time they appear in the technical press.

There are, of course, some engineers who use neither bound volumes nor a personal file. These must depend upon books and memory. Books are always behind the times. When facts are incorporated into book form they are common property and little credit redounds to the engineer who then and only then puts them into practice. The age of standard books varies from a few months to a dozen years. Upon the death of an author of a standard book in some line there is often a lapse of 10 to 15 years before the intervening progress is again adequately treated. The present average age of books in representative lines, dating from last revision, is four years.* Some years ago it was nearly seven years. The intervening period cannot be ignored by the engineer who pretends to be well informed. In stamping a man as poorly or well informed it often assumes an importance out of all proportion to the information already published in book form. It may be conservatively estimated that at least 20% of the information worth while found in technical journals never appears in books. Authors of books sometimes endeavor to conceal the source of their information, and in doing so, often so obliterate or alter the original data that their value is materially reduced.

Memory can seldom be relied upon, even in the most limited lines, to recall published data. The question narrows down to a choice between a personal file and bound volumes.

The personal file entails more work to maintain; but none at the time the information is desired. The time and labor necessary in referring to bound technical journals result in their being consulted only as a last resort. Their use becomes increasingly rare and reliance is soon placed solely on books. The information in a personal file is also better arranged. No one can index technical information for the engineer as well as he himself. The personal file will also contain notes collected in practice that cannot be found in any technical journal. Where bulk and weight must be taken into consideration, the personal file has a marked advantage.

The question as to whether filing will pay depends upon so many factors that each engineer can only decide the matter to his own satisfaction by trying it. If done with intelligence and patience, it would prove profitable to a great many engineers who now depend upon bound volumes or upon not much of anything.

In the case of the young engineer just starting in his work it is safe to generalize and say that filing will pay if the topical method is followed. It will give him an insight into the correlative value of various subjects that he would be slow to get in any other way. If he draws up a classification with care, so that the arrangement is logical, it will serve as a framework for mentally classifying and retaining the appreciable amount of information which is necessarily absorbed in filing technical information. It is a well-known psychological law that logical arrangement greatly facilitates the powers of memory.

A good file, like everything else worth while, requires some effort. It offers no royal road. The topical system will not fully meet all the situations that arise, although it is superior to other methods. Articles are written from so many different viewpoints, and progress introduces so many new phases, that even the best classification will not be all that could be desired. Classification is not an exact science, but rather a continual compromise. It will never be possible, by any practical system, to file every article with the same finality of two plus two makes four, yet the results that may be obtained will well repay the labor required.

The more general the practice of filing among technical men the higher will the standard of engineering practice be maintained.

*This is an unusually low average due to numerous revisions and new publications within the last few years.

South Australian Mines' Output

The official figures for the 1913 mineral production of South Australia, arranged in order of descending value, are as follows: Copper, 7161.1 tons; salt, 65,000; iron ore, 60,658 tons; gold, 6556 oz.; limestone, 44,300 tons; phosphate rock, 5690; gypsum, 7150; silver-lead ore, 153 tons; silver (not in previous item), 2660 oz.; all else, £6489.

The Australian Zinc-Ore Contracts

The status of the controversy over the Australian zinc-ore contracts is reported by the London *Mining Journal* as follows:

In the House of Commons, on Apr. 20, the Secretary for the Colonies was asked whether the Australian Government had, since the outbreak of war, made any representations to the imperial government in regard to the cancellation of contracts under which Australian mining and metal companies were compelled to supply their ores and concentrates to a metal combine in Germany until 1921; whether any proposal was made for uniform action on similar lines for the whole empire; and, if so, in what way did his Majesty's government propose to assist the Australian Government to effect its purpose.

Mr. Harcourt replied that representations have been made by the commonwealth government since the outbreak of war to the effect that a large proportion of the output of base metals in Australia has been during recent years under German control, and that it is desired to free from such control the copper, zinc, lead, and tin industries. The commonwealth government has suggested concerted action as between itself and his Majesty's government with a view to the cancellation of contracts for the disposal of base metals to a German combine. The proposals of the commonwealth are receiving most careful consideration, but the matter is one of great complexity. Mr. Harcourt called attention to the recent passing of the Legal Proceedings against Enemies Act, which provides facilities for any doubts which may exist as to the effect of the war on contracts of the kind in question to be expeditiously resolved by the courts.

Mineral Output, Northern Territory, Australia

The value of the mineral output of the Northern Territory of Australia, which is now administered by the commonwealth (its production being reported separately), was for 1914: Gold, $51,633; tin, $72,960; copper, $23,328; silver-lead, $2616; wolfram, $19,320; mica, $2016—total value, $172,873. A decrease in the number of mineral rights held by Chinese is reported. No immigration of Chinese is permitted, and it is believed that those in the country are gradually dying off.

Multistage Centrifugal and Cornish Pumps in Chapin Mine

By L. E. Ives

The amount of water pumped from the Chapin mine at Iron Mountain, Mich., operated by the Oliver Iron Mining Co., is approximately 3000 gal. per min. Previous to October, 1912, 2000 gal. per min. of this water was encountered in the No. 2 Hamilton shaft at the 965-ft. level, the remainder coming from other parts. Before the installation of the "C" Ludington shaft all pumping was done at the No. 2 Hamilton, and the water was handled as follows: 1300 gal. per min. was pumped from the 16th, or 1300-ft., level to the surface by a 22&36x30-in. Riedler triplex tandem compound condensing crank-and-flywheel pump, with 9⅝&6⅞-in. differential plungers, operated by steam; 1200 gal. per min. was pumped from the 12th, or 965-ft., level by a steam-operated 15&23&39&9¼x24-in. stroke, triple-expansion duplex direct-acting Prescott pump; 500 gal. per min. was pumped from the same level by an 18&34&10x24-in. stroke, compound, direct-acting duplex Prescott pump operated by compressed air furnished by the Quinnesec Falls hydropneumatic plant.

Pump Station at 12th Level, Chapin Mine

Use of Electricity Decided Upon

When the "C" Ludington shaft was sunk a large Cornish pump was installed there, which was operated by steam and could handle 2000 gal. per min. from the 1500-ft. level to the surface. When this pump was in operation, it was necessary to operate only the direct-acting pumps on the 12th level, with compressed air. In order to realize the economies which would result from operating these mine pumps with electricity generated by water power, it was decided further to improve the hydraulic plant at the upper Quinnesec Falls on the Menominee River and to install a hydro-electric plant and a transmission line 3½ miles long to the mine. While these plans were being prepared a drift on the 16th level tapped the water-bearing strata connecting with the 12th level. This necessitated a revision of plans, so that all the water should be pumped from the 16th level to surface.

Electric Centrifugal Pumps

The pumping installation consists of two 3-stage Worthington centrifugal pumps, having a capacity of 3000 gal.

per min. against a head of 412 ft., each direct-connected to a 450-hp. G. E. 2200-volt, 60-cycle induction motor, operating at 1200 r.p.m. Each pump is capable of handling the entire mine flow from the 16th level to a reservoir on the 12th level, a 392-ft. vertical lift. On the 12th level were installed two 6-stage Worthington centrifugal pumps, of a capacity of 3000 gal. per min., against a head of 1000 ft., each direct-connected to a 1050-hp. G. E. 2200-volt, 60-cycle induction motor, operating at 1200 r.p.m. Each of these pumps has a capacity sufficient to handle the entire mine flow from the 12th level to surface, a 965-ft. vertical lift.

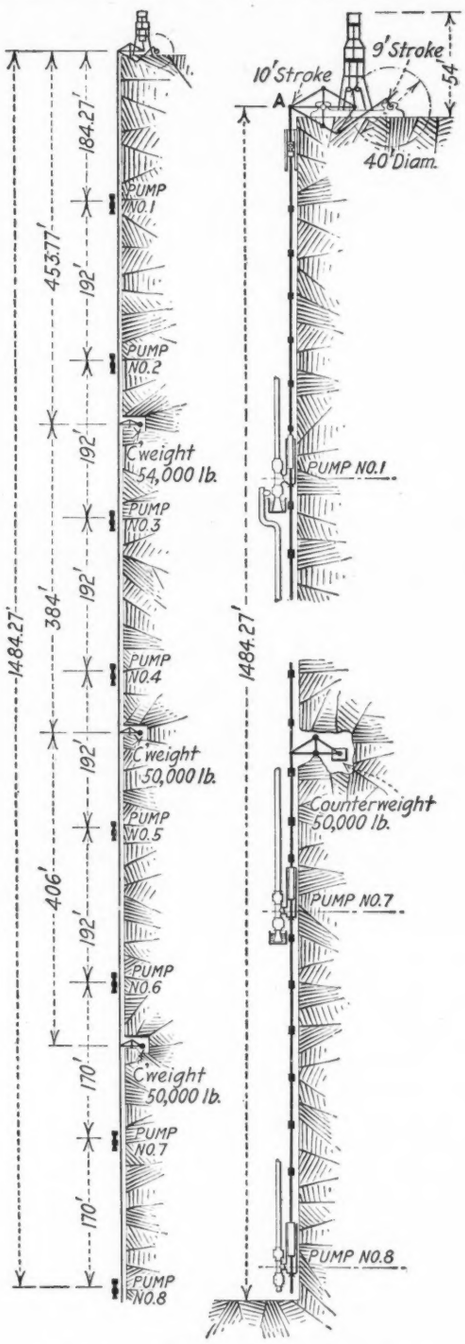
Under normal conditions only one pump on the 16th level and one on the 12th level will operate simultaneously. There are, however, two independent discharge-column pipes, making it possible to operate both pumps on both levels simultaneously, thereby providing a maximum capacity of 6000 gal. per min. from the 16th level to surface. These pumps are of the multistage turbine type, built in units of three stages each. The 16th-level pumps consist of one unit of three stages, mounted on a common cast-iron bedplate with the motor; the 12th-level pumps each consists of two 3-stage units mounted on a common cast-iron bedplate, each unit being connected to one end of the motor shaft. The four 3-stage units are identical in design and dimensions, so that all parts are interchangeable, except the impellers. The electrical pumping plant on the 12th level has been in operation for several months, and during a 30-day operating period the overall wire-to-water efficiency was 72%, as shown by the integrating watt meter, the Venturi meter, and the pressure gage at the discharge of the pump. This efficiency also includes the losses in the cable from the substation down the shaft to the pumps, as well as approximately 2.6 continuous kilowatts for lighting.

In the No. 2 Hamilton engine house is installed a relay steam-driven electric plant, consisting of an Allis-Chalmers, high-pressure 2400-kw. maximum capacity, steam turbo-generator set, with steam turbine-driven and motor-driven exciters, and an Alberger spiroflo high-duty condenser, with centrifugal tail and rotative dry-air pumps. This steam turbine will furnish power for operating the pumps in case of accident to the hydro-electric plant or transmission line.

Cornish Pump

There was originally installed at the "D" Chapin shaft, about 25 years ago, to pump from a depth of approximately 600 ft., one of the largest pumping engines in the United States, built by the E. P. Allis Co. Soon after its installation, however, the shaft began to get out of alignment, and it was necessary to abandon the shaft and dismantle the pump. Seven years ago this pump was reinstalled at the "C" Ludington shaft to pump from a depth of 1513 feet.

The engine is a 50&100x120-in. steeple-compound condensing machine, and on its main shaft is mounted a flywheel 40 ft. in diameter and weighing 160 tons. The height of the engine from the top of the foundation to the top of the high-pressure cylinder is 54 ft. This engine operates, through a walking-beam, a series of eight 28x120-in. stroke, single-acting plunger pumps, located in the shaft at intervals of about 200 ft. The pump rod is solid openhearth steel, 8 in. in diameter for the top 800 ft. and 7 in. for the lower 700 ft. The plungers are 28 in. in diameter, and the displacement is practically 295 gal. per rev. The total weight of the engine is 600 tons; the total weight of the moving parts in the shaft is 325 tons. During a 12-month period this pump operated 99.5% of the entire time at a rate of 6.63 r.p.m., pumping 1922



Cornish Pump at Chapin Mine

gal. per min. against a head of 1513 ft. The average delivered horsepower was 736, and the average indicated horsepower, 831, making the mechanical efficiency 88.6%. The duty performed was 86,200,000 ft.-lb. of work per 1000 lb. of steam, including all auxiliaries.

Copper-Bearing Pyrites Deposits are stated by recent consular reports to have been found about 18 miles from Elisiabetpol in Southeast Russia. One deposit is being worked in a small way, 18 or 20 tons a day being taken out and shipped to acid works at Baku. Other deposits are reported to exist in the district.

First Aid at the Old Dominion

EDITORIAL CORRESPONDENCE

I attended the first-aid meeting of the Old Dominion Copper Co. on May 4 and was surprised at the large gathering. The total number of employees is 535, and the attendance was 93. The first lesson, which was covered, consists of the preliminaries and ends with the control of hemorrhages by the application of bandages to various pressure points.

The second lesson embodies the triangular bandage and its uses; flesh wounds, and use of compresses. At this lesson "The First-Aid Book," Blakiston's Miners Edition, is given. Lesson 3 treats of the roller bandage and its use, fractures and their early care, ending with those of arms and ribs.

Lesson 4 takes up fractures of the leg, and stretcher and basket drill; lesson 5, pulmotor, artificial respiration and transportation of wounded.

These five lessons cover the course, ending with a strict examination conducted by the physician and assisted by First-Aid Instructor Orr Washburn. Those who pass are given a button, a red cross on a white ground, with the words "Old Dominion First Aid," gold filled. No one is given a button who has not passed the examination.

The helmet instruction is under the same instructor and is held apart from the first-aid lessons. There are 25 men at present under instruction, all selected, 14 of whom are qualified to wear helmets and were awarded a helmet fob.

The instructor, well known through his former connection with the Bureau of Mines, does no other work except supervision of ventilation.

Apart from this a mine inspector is employed, Bert Fallon, who spends all his working hours underground. The company pays each new man for two days spent underground with this inspector, sending three men at a time. Throughout, this system of first-aid and mine inspection is most complete and should be adopted at all the metal fields.

Chino Copper Co.

The report of the Chino Copper Co. for the first quarter of 1915 shows a production of 11,732,508 lb. of copper—3,563,618 lb. in January, 3,722,803 lb. in February and 4,446,087 lb. in March. A total of 406,000 tons of ore was treated, with an average of 2.1851% copper. The average extraction was 66.12% equal to 28.898 lb. of copper per ton of ore milled. There was a production of 21,401 dry tons of concentrates, containing an average of 27.411% copper.

The cost per pound of net copper, after allowing for smelter deductions, and without allowing any credits from other sources, was 7.04c. Allowing for the credit for gold contained and crediting income from miscellaneous sources, the cost would be reduced to 6.38c. per lb. These costs include all operations, administration and general charges, and 30c. per ton of ore treated for the extinguishment of mine development and stripping expense.

The total income from milling operations and miscellaneous sources was $890,638. A dividend of $434,970 was paid, leaving a surplus of $455,668. Earnings are based on a price of 14.37c. per lb. for copper. The per ton costs are the lowest that have been made since the property began full operations, amounting to $1.888 per ton.

Chronology of Mining for April, 1915

Apr. 1—Spain placed embargo on iron, steel, tin, sulphur, aluminum, antimony, mineral oils and ammonia.

Apr. 3—Power house and pottery of American Zinc, Lead & Smelting Co., Caney, Kan., destroyed by fire.

Apr. 4—Knight-Christensen mill at Silver City, Utah, burned. Loss, $75,000; no insurance.

Apr. 5—In Butte municipal elections every Socialist candidate defeated, which, it is expected, will add to the prosperity of the district.

Apr. 7—Alaska-Juneau Gold Mining Co. offered 400,000 shares capital stock at $10 per share.

Apr. 10—President Wilson announced the route of the Alaska Railway.

Apr. 12—Alaska-Juneau stock offering oversubscribed four times and trading on Curb begun at $13 to $15 per share.

Apr. 13—Bethlehem Steel stock reached high price of 155.

Apr. 14—Plant of Western Zinc Oxide Co., Leadville, Colo., started operation.

Apr. 15—Work resumed at East Butte mill.

Apr. 19—New pumping machinery for draining downtown district of Leadville, Colo., started operation.

Apr. 26—Mining Corporation of Canada, controlling Townsite, City of Cobalt and Cobalt Lake properties, started its new cyanide annex to treat slime products from above-mentioned mills.

Apr. 29—Work begun at Ship Creek on construction of Government railroad in Alaska.

Tin Smelting Plant to Be Constructed in Chile

According to Commercial Attaché Verne L. Havens of Santiago, the Compañía Estañífera de Llallagua has decided to organize a separate company for the purpose of constructing a tin-smelting plant in Arica or Mejillones. The capital will be 50,000 shares of a par value of £1. The Llallagua company will itself subscribe for 20,000 shares and will offer 30,000 shares to its own stockholders.

Dissolution of Amalgamated

Amalgamated purposes to dissolve, giving each shareholder two shares of Anaconda for each share of Amalgamated; the right to subscribe to one share of Anaconda at 25 for each six shares of Amalgamated held; the May 31 dividend of 50c. per share, and a cash bonus of $3. The annual meeting will be held on June 7, and action will be taken at that time on the question of the dissolution of the company.

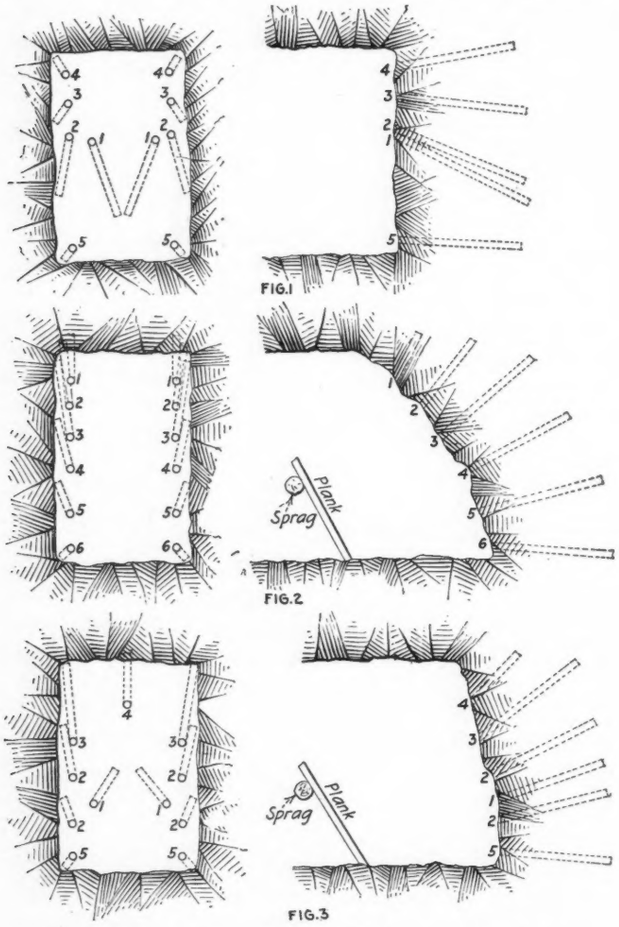
Asphalt Deposits at Tacloban, Leyte Province, in the Philippine Islands, are to be developed by the Leyte Asphalt & Mineral Oil Co., organized at Manila with $150,000 capital. The company has 656 hectares of land near the sea, and shipments can be made by water at small expense. Some of the asphalt has been sold to the Government for use on roads. The asphalt is said to extend along the coast for 15 miles, outcropping at intervals. The company will also prospect for oil on its property.

Details of Practical Mining

Drifting with a Stoper

By G. E. Wolcott*

The stoper, which has come into such general use for overhead work, has, principally through the requirements of the leaser and small operator, been adapted to drifting. It has not been adopted for this purpose to any great extent by the larger companies because in their case the cost of a piston drifting machine is not generally felt. In the case of the leaser, however, low equipment expense is



Piston-Drill and Stoper Rounds in Drifting

imperative. It is this fact rather than any advantage of the machine itself that is responsible for its use for drifting.

In the Cripple Creek district the drifts are usually from 3½x6½ ft. to 5x8 ft., and the arrangement of holes for a piston machine in average ground is generally as shown in Fig. 1. When the stoping machine is used for drifting, holes are placed differently. Since flat and down holes are drilled with difficulty by this machine, as many holes as possible are inclined upward, and as a rule only the two lifters are drilled looking down. In Fig. 2 is shown the general arrangement of holes. A setup is made by using a plank leaning against a sprag as shown. The stinger of the machine is placed against the bottom of the plank for drilling all holes except the lifters; for the latter it is raised a foot or more, as desired. The face of the drift is not ordinarily kept vertical, because the holes are more readily drilled with an inclined breast as shown. The holes do not, however, have a good show to break to start the round, and in order to keep the back to the required height it is necessary to drill the holes deeper than they will break. A better arrangement, and one requiring fewer holes, is shown in Fig. 3, in which the cut holes are bottomed as near the center of the breast as possible, where they have the best chance to break. With the stoper it is impossible to obtain as good a cut as with a piston machine, and in hard-breaking rock this must be offset by an increased number of holes.

A drawback to the use of the stoper for drifting is the fact that the muck must be thrown back farther from the breast to make room for the machine. The ordinary stoper requires not less than 6 ft. between the point of the stinger and the breast. If the stoping bar is shortened, too many changes of steel are necessary.

*Box 818, Cripple Creek, Colo.

Rock-Drill Nicknames

By J. R. McFarland*

Rock drills, like human beings, acquire nicknames. Some were derived from those of the pioneer drill manufacturers, others were originally trade names of the drills and gradually became accepted as representing that entire type of drill. In other cases the names are descriptive of the action of the machines.

The pioneer in the rock-drill field in this country was the Burleigh drill, introduced in the Hoosac Tunnel in 1866 by the Burleigh Rock Drill Co., of Fitchburg, Mass. This was one of the first large engineering undertakings in this country, the object being to tunnel the Green Mountains, the natural barrier to traffic between New York and the New England states.

The Burleigh rock drills, later used in the Western mines in considerable numbers, were quite heavy and required two men to handle them.

When the smaller, one-man drills were introduced, the runners still continued to call all heavy, two-man drills "burleighs," irrespective of make.

Opposed to the "burleigh" is the "chippy," the name given to all piston machines lighter in weight and running more rapidly. As the demand on one-man drills in recent years has been for more and more speed and strength, the machines have increased in weight to such an extent that the application is now hard to see.

The "Waugh" was one of the first stoping drills to appear. In some of the Western camps the miners still

*510 Kimbark Ave., Chicago, Ill.

commonly refer to any stoper as a "waugh." Down South a stoper is commonly known as a "warrior," a peculiar development from the original name, explainable only by the calloquial peculiarity. For a similar reason, or lack of reason, the hollow-steel hand-hammer drill is commonly called a "murphy." The name "jap" is also sometimes applied to this type of drill, and is derived from the trade name "Little Jap."

Among the highly colored names sometimes heard among the miners for the stoping drill are the "wiggle-tail" and the "widow-maker." The "wiggle-tail" is very descriptive of the operation of the machine, and the "widow-maker" refers to the unhealthy effect the dust has on the miners' lungs.

Fortunately, the introduction of sprayers, bags and atomizers for laying or catching the dust at the mouth of the hole and the enforcement of the use of them by some state laws are a start in the right direction toward making the last-mentioned name inapplicable.

When the first self-rotating hammer drill was introduced in this country, several years ago, it was given the name of "Jackhamer" by the manufacturer. This name had taken such a hold by the time competitive self-rotating hammer drills appeared that it was found quite difficult to apply any other name which would be accepted and adopted by the drill men.

With the one-man piston drills and the use of hammer drills for drifting it appears only a question of time until the "burleigh," or heavy two-man piston drill, will be used very little underground.

When the self-rotating stoper becomes fully developed and generally adopted no more use will be had for the tail or the "wiggle-tail," and this creature will die a natural death.

It would seem that, with the tendency toward lighter-weight hammer drills and self-rotation in stoping drills, the miner of the future will have an easy time of it.

Methods for Laying Dust in Mines

The Transvaal Chamber of Mines has published a memorandum[1] giving details of the most efficient dust-laying appliances used for dust prevention in the mines of the Rand. Water sprays of various kinds are still used largely, and where the water is clean and the pressure is sufficient they give satisfactory results. Atomizers have in some cases superseded sprays because they break the water up into finer particles, and the resulting cloud of mist is carried much farther than the fine streams of the spray. Atomizers are not as likely to get out of order as the spraying devices generally used. Another type of apparatus for accomplishing this result is called the "water blast," in which the water is discharged in the dusty portion of the mine in much greater quantity by means of suitable connections with the compressed-air main, the air acting through an ejector nozzle. In using atomizers it has been found that it is possible to break the water up into a too finely divided mist so that it will evaporate so rapidly as to be ineffective in laying the dust.

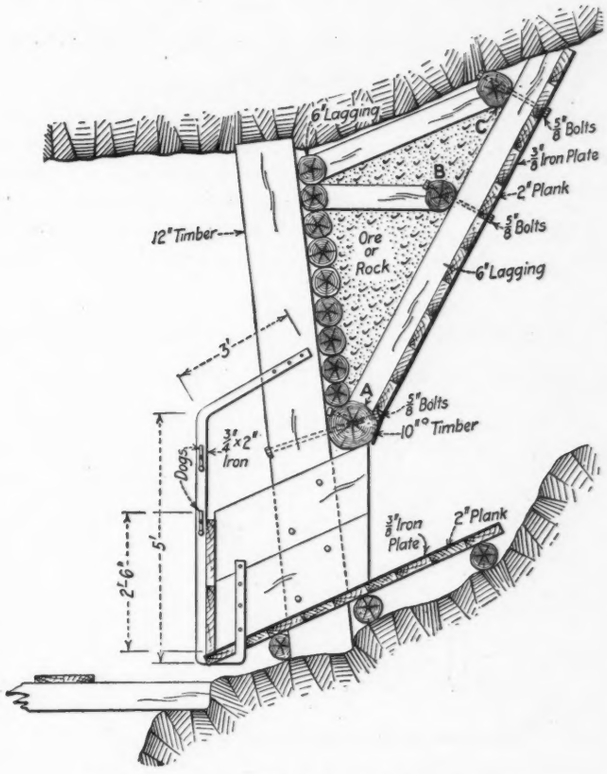
There are places above ground which are very dusty and come within the regulations requiring spraying devices, such as the main crusher stations, sample grinding and sample quartering rooms, etc. Sprays and atomizers as means of eliminating dust in crusher stations have not proved entirely successful. The crushers have been completely housed in, and a considerable amount of the dust from crushing has been drawn off by an air blast. In addition, sprays are used at both the feed and discharge ends of the crusher. It is also a very useful plan to scatter over the floors of sample crushing and quartering rooms damp sawdust, as this tends to retain any dust which may settle.

[1] "Appliances and Methods for Laying Dust in and about Mines," Transvaal Chamber of Mines, January, 1915.

A Substantial Ore Chute

By H. H. Hodgkinson*

When ore is dumped into most ore chutes it strikes a direct blow at almost right angles to the front of the chute. The chute shown in the accompanying sketch is



Ore Chute of Rugged Construction

so constructed that it receives a glancing blow, rather than the full impact, and will resist a great deal of pounding and banging because it is loaded behind with rock or ore.

The stulls and horizontal timbers *A*, *B* and *C* are placed in hitches and carry the chute and the weight of the ore in the chute. Timber *A* is bolted to the stulls as shown, while a layer of 6-in. round lagging is spiked in a horizontal position to the stulls. A layer of 6-in. round lagging is spiked to the horizontal timbers *B* and *C*, while the lower ends are supported by timber *A*. The lagging is trimmed so that a layer of 2-in. plank which is spiked to it fits smoothly, thus insuring a good surface upon which to place the 3/8-in. wrought-iron plates so that they will not buckle and tear loose because of a poor surface underneath. The iron plates are 4x8 ft. and have coun-

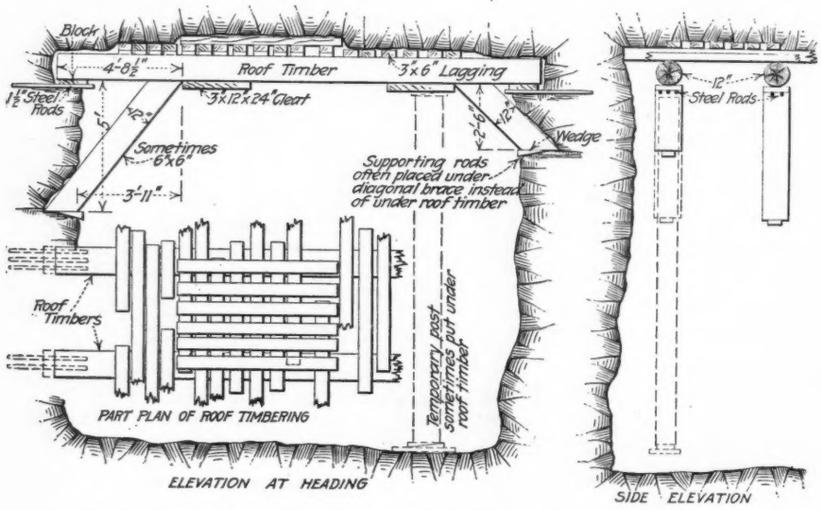
*Mining engineer, Franklin Furnace, N. J.

tersunk holes for 5/8-in. bolts, which pass through the main timbers *A, B* and *C,* as shown, clamping the front of the chute firmly together, in addition to securing the plates. Iron plates are bolted on the sides of the planks at the mouth of the chute and also to the bottom. The timbers are stulled to stiffen the chute, and the space between the front and back of the chute is filled with ore or rock, which gives solidity to resist shock.

Although the initial cost of this chute is somewhat greater than that of the average chute used, its life is many times longer. A number of these chutes have been in use constantly for four years and have probably received as much banging and bumping as any other chutes used, yet no repairs whatever have been necessary and they are as good as when first installed, except for a little wear at the lower ends of the iron plates.

Roof Timbering in Milwaukee Tunnel

At the Linwood Ave. intake tunnel of the Milwaukee water-supply system great difficulty was experienced in maintaining the timber sets in proper position at certain points because the material encountered, Hamilton shale, disintegrated and scaled off soon after being exposed to the air. This scaling deprived the timber sets of their supports, the side hitches in the shale collapsing. Lee G. Warren* in *Engineering News,* Apr. 8, describes the method shown in the figure for supporting the flat roof in shale.



METHOD OF SUPPORTING ROOF TIMBERING IN SHALE; LINWOOD AVE. INTAKE TUNNEL

Into the base of each side hitch cut for the roof timber three 1½-in. holes, 3 ft. deep, were drilled with a pneumatic hand-drill, and then a 1½-in. steel rod, 3 ft. long, was driven into each hole. On the set of three rods was placed a block 2x10x12 in. The round roof timber, of maple, 12 to 14 in. in diameter, was then laid on the small blocks resting on the rods. Finally, slanting braces of maple 6x6 in. were fitted to the roof timbers, these braces resting in hitches that were cut in the side of the excavation. Frequently the supporting rods are placed at the hitches for the slanting braces instead of at those for the roof timbers.

The timber sets were placed 2 ft. c. to c. Since inaugurating this new timbering method no roof timbers have fallen and no roofs have collapsed. Numerous instances have occurred where the excavations have scaled off beneath the hitches, leaving the steel rods entirely exposed for 1½ ft., but they showed no signs of failing.

*Resident engineer, Linwood Ave. Intake Tunnel, Milwaukee, Wis.

Sand Filling*

Sand filling was introduced in the mines of the Rand in 1910, and at the present time 15 mines there have installed hydraulic equipments for filling the worked-out stopes with tailings from the various milling plants. The tailings are taken from the old dumps, or direct from the cyanide tanks, and discharged into a box-shaped receptacle at the collar of the shaft, from which the pulp is conveyed through 6-in. cast-iron pipes to the desired destination underground. In the larger installations two pipes are used in the shaft, one being plugged and held in reserve. When one pipe wears through or bursts the other pipe is brought into commission. Both pipes are connected to the same pipe line at the bottom of the shaft. At other mines the sand is washed direct from the old tailings dump by means of water at high pressure delivered by hydraulic monitors using 3-in. nozzles. The pulp then flows through launders to a small shaft, at the bottom of which are launders which convey it to the desired stopes. When the tailings can be discharged from the cyanide tanks direct to the shaft the cost of stacking the tailings on the dump is eliminated. Mining regulations prevent any tailings containing more than 0.005% of total cyanide being sent underground. In this system the ore hoisted from the mine is returned again, about a fortnight later, minus its gold contents. A ton of ore which occupies a space of 12 cu.ft. in the mine yields about the same volume of sand—50% of sand and slime—for return underground. Boreholes put down either with a jumper drill or with a shot drill are also used for conveying this material to the underground workings.

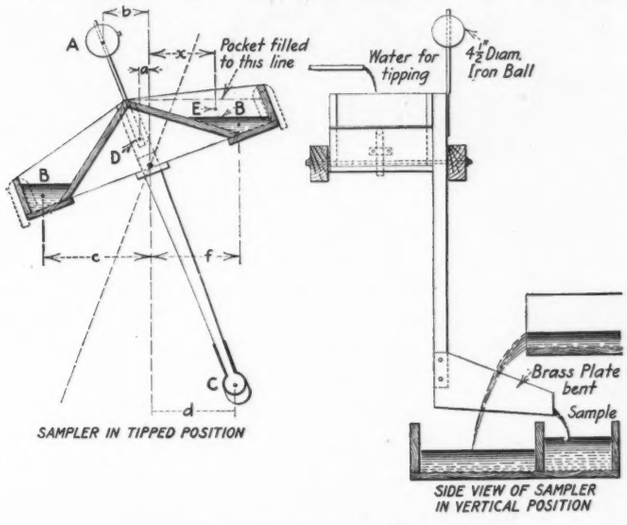
Ordinarily cast-iron pipes, wood-lined pipes and, to a small extent, porcelain-lined pipes have been used for conducting the pulp to its ultimate destination. Conveying in launders, however, is preferable to using pipes whenever the gradient is suitable. When a stope is to be filled with this material, barriers have to be built to hold the sand in the required position; but they are so constructed as to allow drainage of the water. When the mines are very deep—3000 ft. to 4000 ft.—a heavy expense is incurred for pumping all of the extra water which is needed to flush these tailings into place. During a period of four months the Robinson Deep sent 103,261 tons of sand back into the mine—which represented 98.1% of the total production at the mine—at a cost of less than 20c. per ton of sand.

*Transactions of the North of England Institute of Mining and Mechanical Engineers, November, 1914.

Details of Milling and Smelting

Siphons on Solution Samplers

Many difficulties were encountered in placing siphons on a sampler of the Copper Queen Consolidated Mining Co., Bisbee, Ariz. Small particles would collect in the siphon and cause the sampler to stop working. The balance weight had to be placed so far from the center of rotation that its fastenings became loose. This led to an investigation with the view to changing the sampler to avoid trouble. It was thought best to take the siphons off, which was done. The absence of the siphons of course allowed a certain amount of water to remain in the sampler, but at the same time the weight had to be moved toward the center of rotation in order to make the sampler tip when the pocket had filled. Thus the twofold purpose was accomplished—the siphons gave no more trouble, since they had been removed, and the weight also was less bother. The jar on the mechanism was less, since the



SOLUTION SAMPLER WITHOUT SIPHON

ball had been moved closer to the axis of rotation, and its energy thereby decreased, and the water remaining in the pocket was not fixed rigidly to the mechanism and did not tend to carry it in the direction of rotation.

The foregoing conclusions can also be drawn in a theoretical manner about as follows: Assume that

A = Weight of the ball.

B = Weight of the water remaining in a pocket when siphons were not used.

C = Weight of lip.

D = Weight of sampler (wooden part).

E = Weight of new water added to make sampler tip when siphons are not used.

Note that the amount of water, $B + E$, was necessary to fill the pocket and tip the sampler in each case—when siphons were used and when they were not. When the siphons were used, the amount of water, $B + E$, was added each time the sampler tipped. When the siphons were taken off, E was the only water that was added each time to fill the pocket, since the amount of water B remained there constantly. It might be added that in places where water rates are high a sampler without siphons would be an economic advantage, since clear water is required for a sampler with siphons.

The small-letter dimensions on the sketch give the distance of the center of gravity of the respective weights to the vertical axis. For conditions of equilibrium the instant before tipping in either case, $E\ M = O$.

The moment equation without siphon is,

$$(Ab + Da + Bc) - (Bf + Cd) = Ex.$$

Note that the weight of water B, after tipping, is the same on each side, but on account of the position of the sampler the water on the up side is shallower than that on the down side. Therefore, the center of gravity of the up-side water is nearer the vertical axis. We have, consequently, $Bc > Bf$.

When siphons are used, the equation of moments becomes

$$(Ab' + Da) - Cd = Ex + Bf, \text{ or,}$$
$$(Ab' + Da) - (Cd + Bf) = Ex.$$

Equating equations of moments with and without siphons, we obtain

$$A\ (b' - b) = Bc.$$

This last equation shows that if siphons are used, the ball must be moved up until its increased moment equals the moment of the water which remained in the pocket after tipping when siphons are not used.

As a matter of information it might be added that the above-described sampler now cuts a sample of 3 cu.ft. of water in 24 hr. If a smaller sample is needed, the tipping water is cut down. If a larger sample is desired, the ball is moved nearer the center of rotation.

Matte Assay by Furnace Foremen

At many places, particularly where it is necessary to run the blast furnaces by physical criteria, the furnace foreman must be able to gage the grade of the matte. This is sometimes done by an examination of the fracture of a small sample button. At Mt. Lyell, George F. Beardsley introduced a simple determination which could readily be made by the furnace foremen. At the New York Section dinner of the American Institute of Mining Engineers Robert Sticht described this proceeding as follows: The shift bosses take a dip sample of matte four or five times a shift and analyze it for copper. They are given a bottle of standardized solution of cyanide of potassium from the laboratory. They weigh out a certain amount of the ground-up matte on a coke balance and dump it into a beaker of water, put a little nitric acid on it, boil and dilute with water, add ammonia, stir, and titrate direct from an ordinary burette until the color disappears, filter and titrate again to finish. Then they read on the burette the number of cubic centimeters used and multiply that by the figure given on the cyanide bottle

by the chemists. The determinations are within 1%, which is near enough to serve as a guide, and in addition it makes the furnace work more interesting for the men. When this work was started the foremen were given a "bush" balance, constructed of bits of wood, glass rod, wire, a needle and paper. These worked quite as well as the present pulp balance—when the wind was not blowing.

Method of Treating Carnotite Ores

A new method of treating complex carnotite ores has been suggested by Charles W. Danforth, William P. Samuels and W. T. Martersteck (U. S. pat. 1,126,182). The ore is crushed to pass about a 40-mesh screen. It is then subjected to a plain oxidizing roast with a temperature of about 1100° F. Roasted ore is now treated with a strong solution of sulphuric acid, or a warm solution may be used. This fixes all the radium with the sands and the barium which may be present in the ore in the form of sulphates, while the vanadium, about 90%, and all the uranium are contained in the solution. Precipitates and insoluble matter are settled and the supernatant solution is decanted or filtered off. Vanadium and uranium may be recovered by various methods, depending on the form in which it is desired to market the final product.

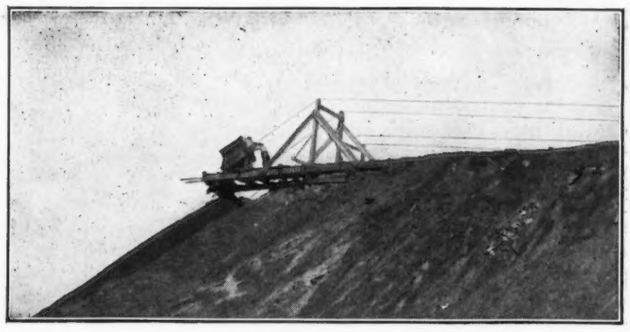
Some complex ores are preferably treated directly after the roasting, while still warm, with a solution of sulphuric acid of about 1.3 sp.gr. at a temperature of about 80° C. The extraction is completed in about 40 min., according to the temperature of the solution. More than 90% of the vanadium and all of the uranium present are dissolved, and the solution may be separated from the residues by gravity, filtration, or by means of a suction filter. Vanadium and uranium are recovered from this solution in any desired marketable form.

If complex ores are to be worked which, according to preliminary tests, contain a low percentage of uranium, then the sulphuric-acid solution will contain in the main vanadium, uranium, lime, magnesia, alumina and iron. In this instance the acid solution may be neutralized far enough with an alkali so that the vanadium is completely precipitated, while a considerable amount of the other metallic compounds remains in solution.

For recovering the radium, the residues containing barium and radium are washed with water until they are free from soluble sulphates and sulphuric acid. The residues are then treated with a mixed solution of caustic soda and sodium carbonate, the strength proportions of the components being regulated according to the amount and proportions of silicates and sulphates of barium and radium. This alkaline solution transforms the barium and radium compounds so that the sulphate and silicate radicals are rendered soluble in the form of sodium salts, while the barium and radium form carbonates which remain with the residues. After separation, the residues are treated with dilute hydrochloric acid, dissolving all the barium and radium salts. The solution is then precipitated with sulphuric acid, these raw sulphates separated and obtained in a clean condition, transformed into chloride, and the separation and concentration of radium chloride accomplished by well-known methods. When raw sulphates of barium and radium are precipitated with sulphuric acid, sufficient barium salt must be present, and if not, some barium salt must be introduced to secure the proper ratio between radium and barium salt, thus insuring the complete precipitation of the radium sulphate.

A Suspended Car Dump for Tailings

In dumping sand tailings from a car onto the dump it is often found difficult to empty the car on account of the tailings stacked around and close under the track. The general method of obviating this difficulty has been to build a trestle and run the cars out on it, dumping between or alongside the track and covering up the trestle bents. On the inclined dump, however, this may be avoided by building the small truss shown in the accompanying illustration and fastening it by means of the wire ropes shown, which are anchored to stakes in the solid hill-



SUSPENDED DUMP FOR TAILINGS

side to the rear. By using this device the car has always a clear dumping space beneath it, making dumping easy and rapid, and the truss itself serves indefinitely, since it can be moved out to secure constantly new dumping space. The device is in use at the mill of the Wasp No. 2, near Deadwood, S. D.

Matte Smelting for Tin

An extension of the matting process to tin is proposed by Jan Rueb of The Hague, Netherlands (U. S. pat. 1,124,174), who advised smelting oxidized tin ores, tin scrap and stanniferous junk of all sorts with pyrite to form a tin-iron matte. This is with the object of avoiding the usually great metal losses incurred in the fusion and reduction of these materials in either blast-furnace or reverberatory smelting.

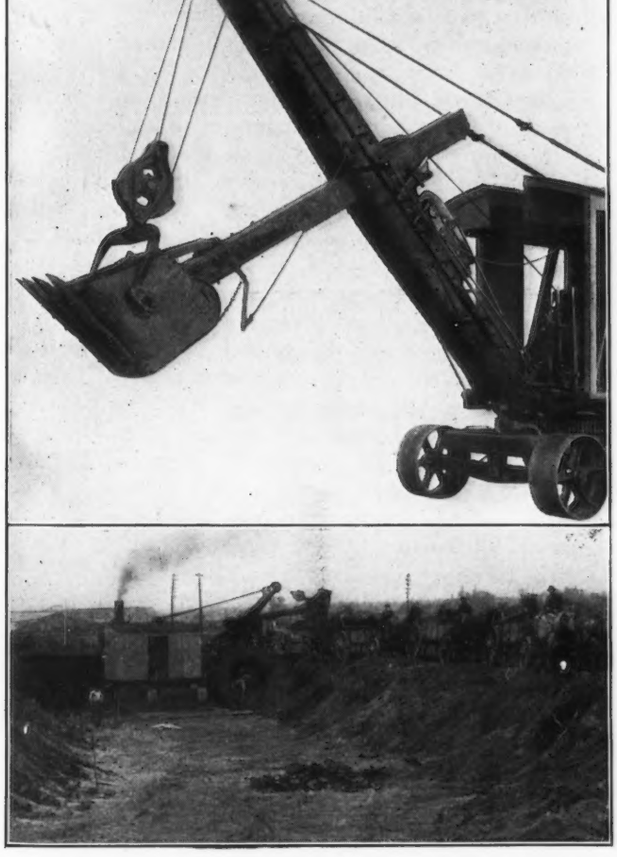
The tin-iron matte thus produced is leached with alkaline sulphides, and these solutions are electrolyzed. This leaching need not be a clean one, as the residue can go back to the matting furnace. The author states that with tin-copper-iron mattes it may be well to roast the matte and leach out the copper before leaching for tin, although one would naturally suppose that the procedure would be reversed.

Slag Settling at Mt. Lyell is carried further than at most smelting plants. Robert Sticht, at a meeting of the New York Section of the American Institute of Mining Engineers, reported that the slag stream from the Mt. Lyell furnaces runs over forehearths for 50 or 60 ft. before it is discarded into the granulating launder; a little matte is caught in each compartment. The average assay of the slag ranges from 0.35 to 0.45% Cu, varying with the grade of the matte. The ratio of concentration is high, about 20:1, a 45 to 50% matte being made in a single smelting.

Mining & Metallurgical Machinery

New Revolving Steam Shovel

A ¾-yd. steam shovel built along the standard lines of the revolving type, but having certain unusual features, is now being manufactured by the Ball Engine Co., Erie, Penn., for light contracting work. The most striking feature is an automatic crowding device, by means of which, if the automatic-control latch lever has been set in the proper notch, the crowding engine works in such relation to the hoisting motion as to cut a level



ERIE STEAM SHOVEL FOR DIGGING LEVEL FLOORS

floor without further manipulation. This relieves the operator of the necessity of constantly playing one engine against the other.

The automatic device is fitted to the ordinary crowding mechanism, in which power is applied by a pair of direct-connected reversing engines rotating a shipper shaft which carries a gear engaging a rack on the dipper handle. When the engines operate they move the dipper handle out or in. The automatic control works as follows: A small pinion on one end of the shipper shaft operates a small auxiliary rack which travels in or out as the dipper handle moves in or out. On the end of this auxiliary rack is a small roller traveling on a miniature track, representing the floor bottom to be cut, which is connected to the control valves of the crowding engines and to the operators' crowding-lever as well by a simple system of levers which governs the relative movement of the hoisting and crowding engines.

To cut a level floor the automatic-crowding latch-lever is dropped into the proper notch on the quadrant, which corresponds to this grade. This operation sets the roller track in a certain position. Now by starting the hoisting and crowding engines the dipper will crowd out along a level line. Placing the automatic lever in the second notch results in a cut slightly downgrade; in the third notch the dipper teeth cut farther below grade. When the latch lever is in the notch nearest to the operator, the automatic device is not in action and the crowding motion becomes the same as on any shovel equipped with a standard shipper shaft and crowding engine.

The manufacturer claims that cuts of 12 in. in depth can be excavated at the rate of 25 to 35 cu.yd. per working hour. The shovel can be used for giving roads an even crown.

The "Erie" shovel is operated by three hand-levers and a foot-brake. One lever controls the crowding engines and another the swinging engines. The weight of the shovel is 41,000 lb. The boom is 17½ ft. long and 17 ft. 11 in. high in working position. The maximum width of cut at floor level is 35 ft. The machine is designed so that either traction or standard-gage car wheels are interchangeable in the same truck frame. It can also be equipped with a special boom or auxiliary apparatus for adapting the machine for locomotive-crane service, or for clamshell, orangepeel or dragline work. It is claimed that the machine will handle a 32-ft. locomotive-crane type of boom and a ½-cu.yd. grab bucket.

Increasing Demand for Large Crushers

The Power & Mining Machinery Co., 115 Broadway, New York, reports that it has built for the Bethlehem Chile Iron Mines a 60x84-in. receiving-opening jaw crusher, sectionalized to a 30,000-lb. limit to facilitate handling at destination. The total weight is 525,500 lb.

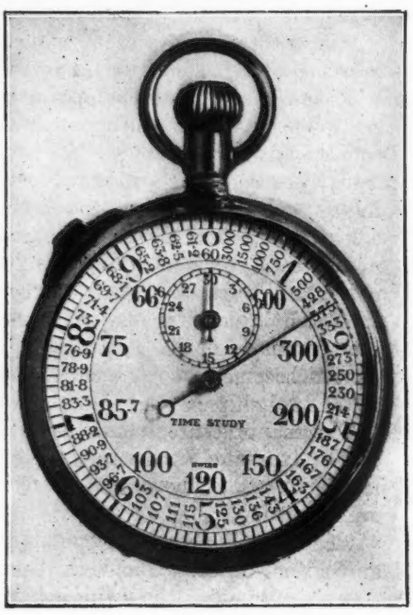
The service in this instance is particularly severe, as the compressive strength of Tofo iron ore is close to 44,000 lb. per sq.in., while that of the hard trap rock of the United States is variously estimated at from 35,000 to 40,000 lb. Immediately following this initial breaker and taking the 10-in. product from it, there will be installed three No. 9 McCully all-steel gyratory breakers.

This company recently shipped a 66x84-in. receiving-opening jaw crusher to a firm on the Coast, and is putting through its shops at the present time another of the same size, which will also be shipped to the Far West. It is stated that the first 60x84-in. machine of this type, built

for the Birdsboro Stone Co., of Birdsboro, Penn., and installed five years ago, demonstrated their feasibility. Approximately 2,000,000 tons of trap rock has been put through this crusher with no expense for repairs other than renewal of the lower tier of crushing plates.

Decimal Time-Study Watch

The time study of various movements in the operations of mining is becoming increasingly common. We therefore illustrate herewith a time-study watch, of which the dial is divided into tenths and hundredths of a minute and, in addition, contains figures spaced two-hundredths of a minute apart. It is so arranged that at any point of elapsed time there is indicated what the corresponding output per hour is. For example, if it requires 0.76 of a minute to perform one operation, as shown by the stopping of the large hand, the reading, 78.9 directly under it, is the corresponding output per hour.



DECIMAL TIME-STUDY WATCH

To start the watch, the slide on the edge is pushed toward the stem; reversing of the position stops it. The hands are brought back to zero by pushing down on the crown. This watch is a recent product of M. J. Silberberg & Associates, Peoples Gas Building, Chicago, Ill.

Automatic Section Insulator

Pat. No. 1,126,092 has been recently granted to William Schaake, of the Westinghouse Electric & Mfg. Co., on an automatic section insulator.

These insulators are inserted in trolley wires where it is desirable to energize a section when the trolley passes onto it and to deënergize it when the trolley passes off. They are used extensively in mining installations where a branch is to be energized only when the locomotive is on that branch. Leakage losses and dangers of contact by persons passing under the trolley wire are thereby averted when the locomotive is not on the branch.

The circuit is opened and closed by a switch-blade mounted on a rocker that the trolley operates. In one position the blade connects with copper contactors; in the other there is no connection. A brass plunger pressing against a steel roller gives a position-centering action and prevents the rocker from remaining in an intermediate position. There is no arcing at the switch contact, because the rocker is always energized and the switch connection is always opened or closed while the trolley wheel is on the rocker.

Cement-Gun Furnace Repairs*

Practically all furnaces, coke ovens, blast furnaces and the like usually develop cracks in the lining, which are repaired in a crude manner by making balls of siliceous or other refractory materials and throwing them into the cracks by hand while the furnaces are hot, or by rebuilding the furnaces after allowing them to cool off. Thus the inconvenience of putting them out of commission for repairs results in a loss of time, as well as of the heat, all of which can be obviated by the use of the cement-gun.

A special nozzle for this class of work has been evolved for use with the regular cement-gun, so that those already equipped with the apparatus need only acquire this new nozzle, thus finding a wider field of usefulness for the apparatus. A special cement-gun has already been brought out to fill the necessities of mining companies, gas companies, smelting and reduction works, which will meet practically all their requirements in the application of Gunite (the product of the cement-gun, resulting from a mixture of ordinary building sand and portland cement) to the lining of mine tunnels and shafts, for building stoppings, etc., for the protection of tipples and other steel structures from corrosion or fire and for the building of miners' cottages.

By simply changing the nozzle the same machine can be used for applying silicrete to lining and repairing furnaces, coke ovens, retorts, etc. The word "silicrete" has been coined to distinguish the product of the cement-gun when used in this particular field—that is, in repairing or lining of all kinds of furnaces with a mixture of fine silica sand and ground fireclay fused by the heat of the oven. It has been found in practice that a mixture of 85% of fine silica sand and 15% of ground fireclay gives the best results. The dry mixture is placed into the hopper of the cement-gun; compressed air at about 35 lb. pressure is used for forcing the mixture to the nozzle, where a small amount of atomized water is added; the aggregate being forced into the cracks immediately fuses, bonding itself to the walls of the furnace and sealing the crack absolutely.

These special extension nozzles can be had in sections 6, 12 and 18 ft. or more long, according to the size of the furnace to be repaired. Where large repairs are necessary the nozzles may be water-jacketed; but for ordinary repairs this is not essential, as the action is rapid and the capacity adequate to make a satisfactory patch before the heat melts the nozzle.

The machine is portable and weighs about 400 lb. and can easily be pulled by one man from one part of the plant to another. The principle and the construction of the machine are identical with the regular cement-gun, with the exceptions of the nozzle and that only one hopper or air lock is provided, which makes it necessary to stop the operation between charges. This only takes a fraction of one minute; but where continuous operation is desired we recommend our No. N-1 machine, which has two hoppers and air locks.

For repairing furnaces, etc., it is advisable for the operator of the nozzle to use an asbestos mask and gloves. Two men are needed to operate the machine, one at the gun and one at the nozzle. The machine is furnished by the Cement-Gun Co., Inc., 30 Church St., New York.

*From information furnished by the manufacturers.

The Assayer and Chemist

Qualitative Analysis of the H_2S Group

The shortcomings of the ordinary methods of qualitative analysis for metals of the H_2S group are well known, the chief being the partial solubility of copper sulphide in ammonium sulphide and the insolubility of tin sulphide under certain conditions in the same reagents. Louis J. Curtman and Joseph K. Marcus have described a method for the analysis of this group (*Journ. Am. Chem. Soc.*, June, 1914), of which we abstract only the essentials.

The filtrate from group I is treated with sulphuric acid and alcohol in order to separate the alkaline-earth metals and most of the lead. Boil down the filtrate from this separation, add 3 or 4 c.c. HCl (to hold up the antimony) and add 75 c.c. saturated SO_2 solution and boil. This oxidizes stannous tin and reduces pentavalent arsenic. The metals are then completely precipitated with sulphureted hydrogen.

Boil this precipitate with 25 c.c. of 25% caustic-potash solution. Dilute with 35 c.c. of cold water and pass in a few bubbles of H_2S to throw down any traces of lead. Filter through a double filter. The residue, after washing with hot water, is analyzed for Hg", Pb, Bi, Cu and Cd. To the clear filtrate, add 30 c.c. 3% H_2O_2 and boil gently for one minute with constant stirring. If a black precipitate appears, filter on a separate filter and test for Hg by dissolving the precipitate in aqua regia and adding $SnCl_2$.

Boil down the filtrate from the H_2SO_3 treatment to 50 c.c. with stirring to get rid of the peroxide. While hot, quickly neutralize with concentrated HCl and add 10 c.c. in excess. Heat the solution to boiling till clear. Add 50 c.c. of a saturated SO_2 solution and heat for 20 to 25 minutes. Boil down to about 70 c.c. Make slightly alkaline with concentrated NH_4OH and then just acid with dilute HCl. Add exactly 2.5 c.c. HCl (1.19), heat to boiling and pass in H_2S for a few minutes. Dilute the mixture to 120 c.c. with cold water and again saturate with H_2S until precipitation is complete. The precipitate of As, Sb and Sn is treated in the usual manner.

Volumetric Determination of Sulphurous Acid

The volumetric determination of sulphurous acid is described by H. Sander, *Chem.-Zeit.*, p. 1057, 1914; abstr. *Journ. Soc. Chem. Ind.*, Mar. 31, 1915.

In sulphurous-acid solutions which contain other substances capable of absorbing iodine, the former may be titrated with sodium-hydroxide solution using methyl orange as indicator; phenolphthalein cannot be used. The sulphuric acid resulting from the oxidation of sulphurous acid by hydrogen peroxide may also be titrated in the same manner. When sodium bisulphite is treated with mercuric chloride before titration, 1 molecule of SO_2 requires 2 molecules of NaOH, as the hydrochloric acid, liberated according to the equation: $NaHSO_3 + HgCl_2 = NaSO_3HgCl + HCl$, is also titrated. For the determination of sulphurous acid in the presence of sulphuric acid see *Journ. Soc. Chem. Ind.*, p. 442, 1914.

Analysis of Crude Sulphur[1]

The author examined the methods available for the determination of sulphur in crude sulphur, especially as applied to low-grade Sicilian sulphur contaminated with bituminous matter. The method of Carius does not yield accurate results, and combustion in a current of oxygen, though serving well for the purer kinds of sulphur, is tedious and less accurate when applied to samples containing notable quantities of bitumen. Satisfactory results are obtained by the method of Fresenius and Beck (*Z. anal. Chem.*, 1903, Vol. 42, p. 21), in which 10 grams are heated at a little above 200° C. to volatilize the sulphur, the residue weighed and then incinerated to determine the bitumen. Accurate results can be obtained by oxidation with nitric acid and bromine by adopting the following method: About 0.2 gram of the sulphur is weighed directly into a 100-c.c. conical flask, which is then fitted, by means of a ground-glass joint, with a reflux tube. The flask is immersed in cold water and while held in an inclined position 10 c.c. of fuming nitric acid (sp.gr. 1.52) and 5 drops of bromine are introduced successively through the reflux tube. The flask is shaken occasionally until most of the sulphur and bromine is dissolved, whereupon a further 5 c.c. of nitric acid are added, and after heating for ½ hour on the water-bath, the flask is again immersed in cold water, the solution diluted with 50 c.c. of water added in small portions through the reflux tube, and the sulphur determined as barium sulphate in the usual way. With low-grade sulphur the determination should always be made with the sulphur separated from the original sample by extraction with carbon bisulphide.

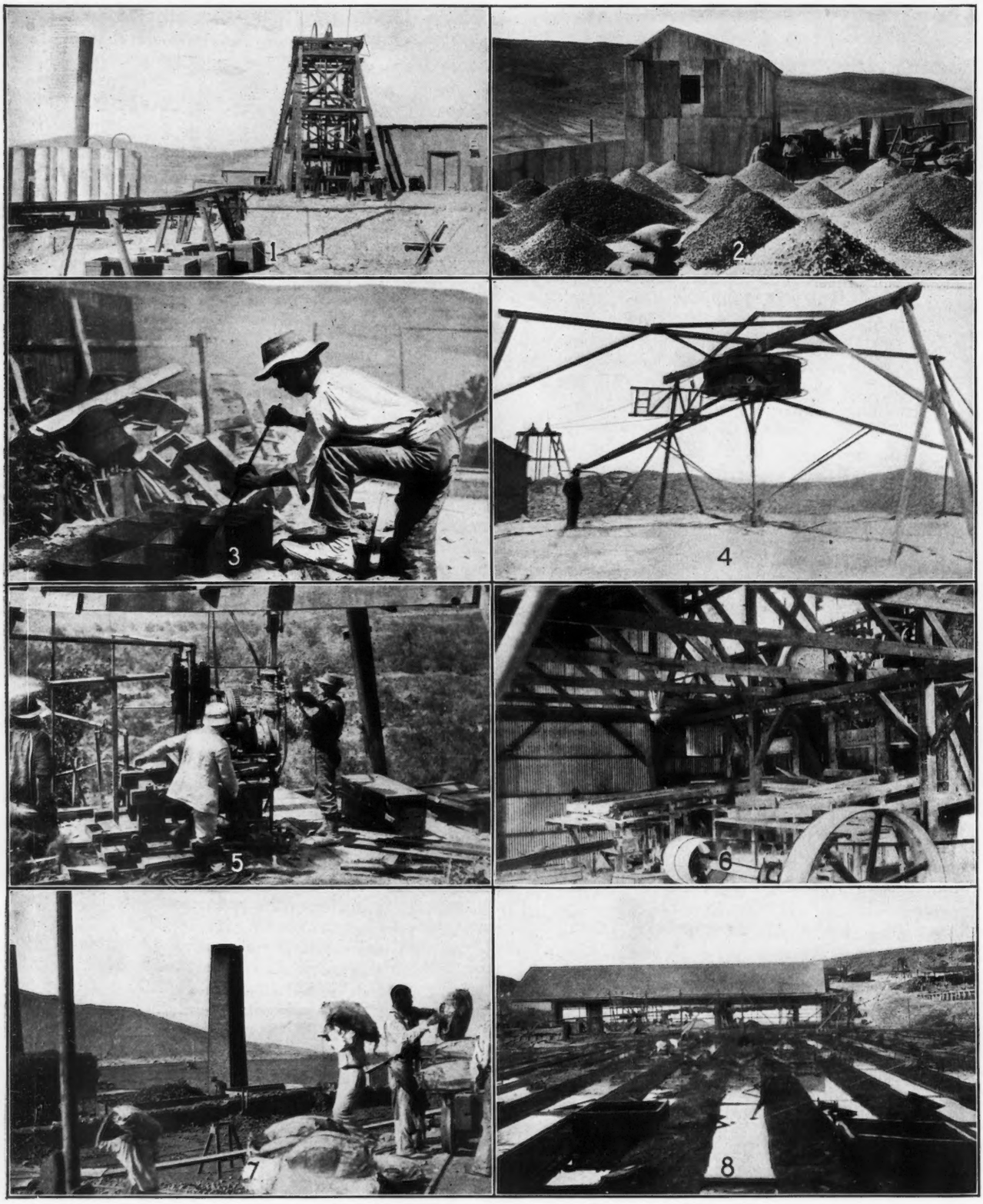
Detection of Carbonate in Presence of Sulphites

A method is given by J. Petersen (*Zeit. anorg. Chem.*, p. 234, 1914; abstr. *Journ. Soc. Chem. Ind.*) for the detection of carbonates in the presence of interfering compounds, especially sulphites.

To the mixture of carbonate with sulphite, etc., hydrochloric acid and a few strips of zinc are added, and the gases evolved are passed at the rate of 2 to 3 bubbles per second through a wash-bottle containing 3% hydrogen peroxide and then into a fairly large volume of lime-water; the solubility of calcium sulphite in water being 1:800, the small quantity formed from the traces of sulphur dioxide remaining in the gas will be dissolved, and any precipitate will be due to the presence of carbon dioxide. If chlorine is evolved the dilute hydrogen peroxide is replaced by potassium-iodide solution.

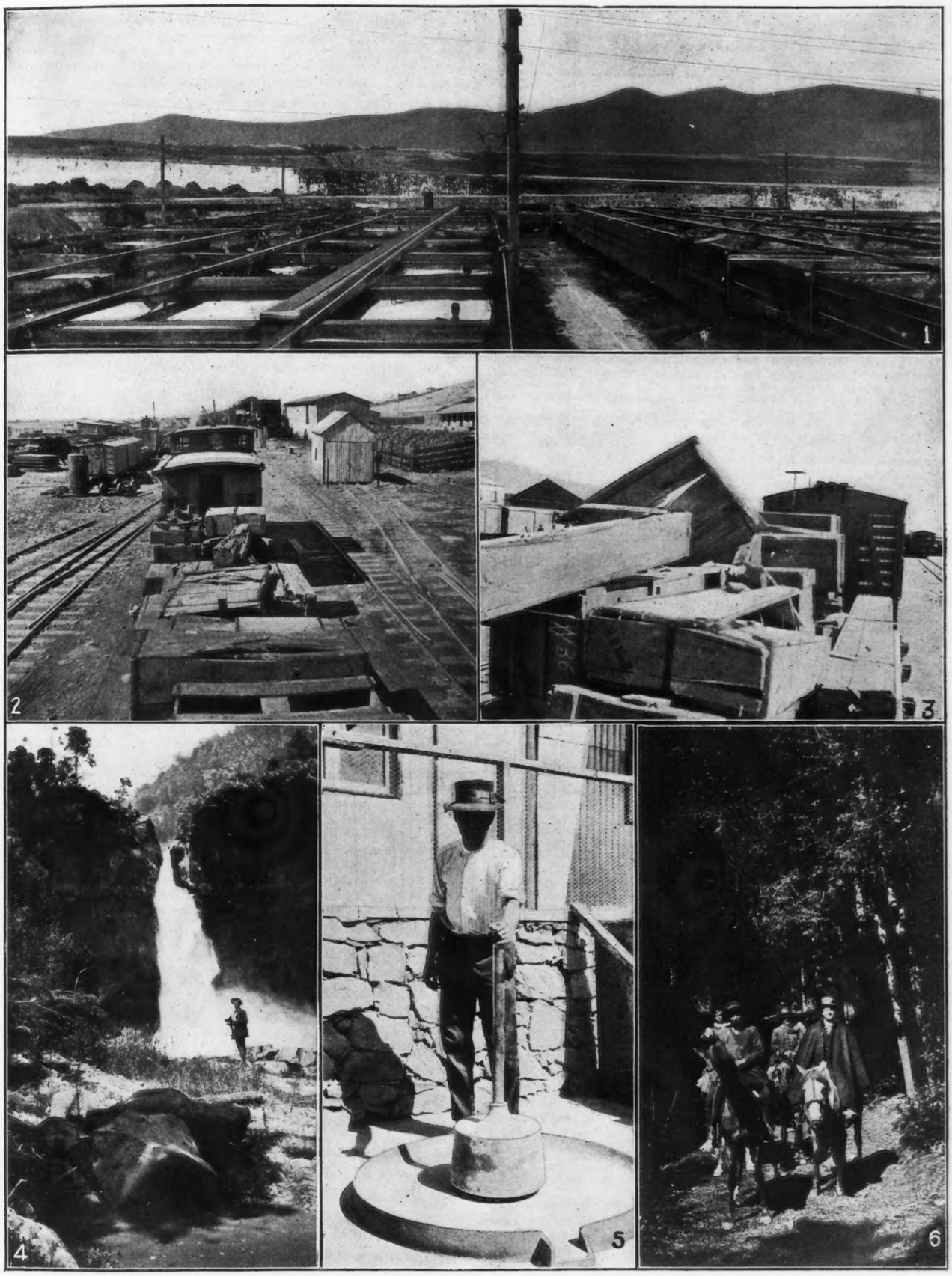
[1]Abstract in "Journ. Soc. Chem. Ind.," Mar. 15, 1915, of an article by M. G. Levi appearing in "Annali Chim. Appl.," January, 1915.

Photographs from the Field



VIEWS OF THE MINERAL INDUSTRY IN CHILE

1. Headframe and tanks at Cachinal, Taltal. 2. Purchased ore at Condoriaco. 3. Drying precipitates at Condoriaco. 4. Horse whim. 5. Diamond-drilling for copper. 6. Loma Blanca gold mill near San Rafael. 7. Making stockpiles, Central Chile Copper Co., Panulcillo. 8. Copper precipitation at Andacollo leaching plant.



VIEWS OF THE MINERAL INDUSTRY IN CHILE

1. Copper precipitation plant at Guayacan. 2 and 3. Machinery arriving at the mines, conditions resulting from poor packing. 4. Waterfall near Chillan. 5. Old-fashioned bucking board. 6. In the forests of southern Chile.

NEW PUBLICATIONS

CENTRIFUGAL PUMPS. By R. L. Daugherty. 5¾x9, pp. 192, illus.; $2. McGraw-Hill Book Co., Inc., New York.

SPRINGS OF CALIFORNIA. By Gerald A. Waring. Pp. 410, illus. Water-Supply Paper 338, U. S. Geological Survey, Washington.

RESULTS OF SPIRIT LEVELING IN MICHIGAN, 1911 AND 1913. By R. B. Marshall. Pp. 79; illus. Bull. 559, U. S. Geological Survey, Washington.

HANCOCK'S APPLIED MECHANICS FOR ENGINEERS. Revised and rewritten by N. C. Riggs. 5x7½, pp. 441, illus.; $2.40. Macmillan Co., New York.

GEOLOGY AND COAL RESOURCES OF NORTH PARK, COLORADO. By A. L. Beekly. Pp. 121, illus. Bull. 596, U. S. Geological Survey, Washington.

MINERAL DEPOSITS OF THE SANTA RITA AND PATAGONIA MOUNTAINS, ARIZONA. By Frank C. Schrader. Pp. 373, illus. Bull. 582, U. S. Geological Survey, Washington.

NORGES BERGVERKSDRIFT, 1913. (Statistics of the Mines and Mine Works in Norway in 1913.) Norges Officielle Statistik, Vol. 29, 6½x10, pp. 79. Det Statistiske Centralbyraa, Christiania, Norway.

FACTS AND FIGURES PERTAINING TO UTAH. Compiled by the State Bureau of Immigration, Labor and Statistics. 6x9; pp. 487; illus.; paper. Tenth Report of State Bureau of Statistics, Salt Lake City, Utah.

ANNUAL PROGRESS REPORT OF THE GEOLOGICAL SURVEY FOR THE YEAR 1913. A. Gibb Maitland, Government Geologist. 8¼x13; pp. 29; illus.; paper. Western Australia Geological Survey, Perth.

PRELIMINARY CONCENTRATION TESTS ON CUYUNA ORES. By William R. Appleby and Edmund Newton. 6x9; pp. 66; illus.; paper. Bull. No. 3, Minnesota School of Mines Experiment Station, Minneapolis, Minn.

SURFACE WATER SUPPLY OF THE UNITED STATES, 1912. Part XI, Pacific Coast Basins in California. By H. D. McGlashan and G. C. Stevens. Pp. 442; illus. Water-Supply Paper 331, U. S. Geological Survey, Washington.

SURFACE WATER SUPPLY OF THE UNITED STATES, 1911. Part XII, North Pacific Coast Drainage Basins. By F. F. Henshaw, G. C. Baldwin, G. C. Stevens and E. S. Fuller. Pp. 706, illus. Water-Supply Paper 312, U. S. Geological Survey, Washington.

MINES AND MINERAL RESOURCES OF IMPERIAL COUNTY AND SAN DIEGO COUNTY. Chapters of State Mineralogist's Report, Biennial Period 1913-1914. By Frederick J. H. Merrill. Pp. 113, illus. California State Mining Bureau, San Francisco, Calif.

CONTRIBUTIONS TO ECONOMIC GEOLOGY, 1913. (Short Papers and Preliminary Reports). Part I.—Metals and Nonmetals except Fuels. F. L. Ransome and Hoyt S. Gale, Geologists in Charge. Pp. 462, illus. Bull. 580, U. S. Geological Survey, Washington.

RULES FOR THE CONSTRUCTION OF STATIONARY BOILERS AND FOR ALLOWABLE WORKING PRESSURES. Report of the Committee to Formulate Standard Specifications for the Construction of Steam Boilers and Other Pressure Vessels and for Care of Same in Service. 6x9; pp. 114; illus.; paper. American Society of Mechanical Engineers, New York.

A TEXT-BOOK OF PRACTICAL ASSAYING. For the Use of Mining Schools, Miners and Metallurgists. By James Park. 5x7½; pp. 342; illus. Charles Griffin & Co., London; J. B. Lippincott Co., Philadelphia, Penn.

This is an elementary treatise on assaying and analysis, taught largely by simple experiments. It seems very well adapted for students in England and the British Colonies, though we believe there are other books better suited for the United States; and we cannot regard with great enthusiasm any book which does not adopt the assay-ton system.

REPORT OF TOPOGRAPHIC AND GEOLOGIC SURVEY COMMISSION OF PENNSYLVANIA, 1913-1914. Richard H. Hice, State Geologist. 6x9; pp. 232; illus. Topographic and Geologic Survey Commission, Harrisburg, Penn.

A report of the work for the two years ended May 31, 1914, together with a brief account of the work in progress. There are five appendices to the report, as follows: (A) List of publications of Pennsylvania Geological Surveys and U. S. Geological Survey relating to Pennsylvania; (B) list of completed topographic maps; (C) report on the South Mountain Copper development; (D) check triangulation net in Carnegie Quadrangle; (C) mineral production of Pennsylvania in 1912.

THE MINING MANUAL AND MINING YEAR BOOK FOR 1914. By Walter R. Skinner. 5¼x8¼; pp. 970; illus.; 15s. Published by the author, 11-12 Clements Lane, London, E. C., England.

The 1915 edition of this standard manual of registered British mining companies has just been issued. It covers completely over 2450 mining companies, and includes a supplementary list giving the names of private and dormant companies or those which have ceased to be of public interest. The names of the companies are listed in alphabetical order instead of by sections, as formerly, an improvement over the old arrangement. In addition to particulars regarding officers, capital stock, dividends, financial condition, etc., of mining companies, the volume contains a list of directors and secretaries, with their addresses, and the companies with which they are connected. It also contains a dictionary of mining terms. The volume maintains its previous high standard as a reference manual, and is especially valuable at this time as a source of information regarding the effect of the European war on the mining industry.

THE PETROLEUM INDUSTRY OF CALIFORNIA. By R. P. McLaughlin. Pp. 519; illus.; separate folio of maps, compiled by R. P. McLaughlin and C. A. Waring. Bull. 69, California State Mining Bureau, San Francisco.

This report, published by the State Mining Bureau, is the finest contribution to the petroleum literature of the state that has ever been issued from any source. The text-book contains 519 pages, including a comprehensive table of contents and an excellent index. This is accompanied by a map folio containing 18 plates. The folio is well bound, and of hard, heavy paper, and is 22x18 in. The sequential order and grouping of the subjects are complete and comprehensive. The subjects are treated in eleven chapters and embrace three distinct divisions: (1) Extent and location of California oil deposits; (2) cost of extracting oil from the deposit; (3) marketing and financial conditions covering the oil industry. The bulletin is written chiefly to provide exact information to (a) the small producing companies and their stockholders; (b) the large marketing companies, and particularly the officers dealing with the public; (c) the state and national legislators dealing with the oil industry. But the bulletin and the map folio reach much farther than the author indicates. The report is at once a text-book for engineers, students, and the general inquirer regarding the oil industry. The special subjects treated include a financial review of the oil industry in 1913, presenting a summary of oil resources; ownership of proved land; geology in relation to the oil industry; operating cost; drilling and pumping; marketing and control and price; the productive capacity of oil lands; underground movement of oil; evaporation and loss of oil; temperature correction in measuring; physical and chemical properties of California oil; some commercial uses of oil; pipe lines; water transportation and exports; shipment by rail from California; reservoirs and tanks; specifications and cost; refineries; gasoline from natural gas; gas production of various kinds. The remaining chapters cover the location, topography, geology, history, productiveness, financial results and directories of operating companies and other information of great value embracing the several fields in the state. The text is well illustrated with photographic reproductions and charts numbering 78 figures.

The geologic record of California printed on the inside cover pages of the map folio is by James Perrin Smith of Stanford University. The 18 plates include correlation and characteristic fossils of geologic formations of the California Coast Range; the geologic and oil field maps; geologic cross-sections; gravity charts; topographical maps; plans for standard and rotary rigs; plans for earthern, concrete-lined oil reservoirs; and map showing portion of oil pipe line. These maps and charts cover the entire operating regions and were brought up and corrected to July, 1914. The entire work has been under the direct supervision of F. McN. Hamilton, state mineralogist, and is a credit not only to himself but to the Mining Bureau and the state. The text-book and folio are sold by the Mining Bureau at the low price of $2, which covers only the cost of printing.

Power House of the San Luis Mining Co.

The power house of the San Luis Mining Co. in Sinaloa, Mexico, is of unusual interest. The Piaxtla River, in its course from the interior highlands to the sea, flows for many miles through barren, rainless foothills before reaching the moist belt of coast land. Somewhat more than 100 miles northwest of Mazatlan it makes a wide, ox-bow curve, flowing for several miles between walls of solid rock, to return at one point to within a few yards of its earlier course. At this point the power house is built. A tunnel a little more than 200 ft. long, driven through solid rock, connects with the upper course. In the power house are two Pelton-Francis turbines. The original power house is of adobe construction, but an addition, in which a third Pelton-Francis turbine is now being installed, is excavated from solid rock.

All of the machinery was sectionalized for mule-back transportation, and the greater portion of it was thus brought in. Some pieces that were too large for mule-back transportation were packed in by Indian carriers on a long pole resting on their shoulders, with the piece in question suspended from the middle.

The outcrop on which the San Luis Mining Co.'s workings are developed is associated in tradition with the source of gold exploited by the Montezumas before Cortez invaded Mexico.

Two False Notions Concerning the Japanese

By Rossiter W. Raymond

Several years ago, during the visit to Japan of a party of members of the American Institute of Mining Engineers, I was honored by his Majesty, the late Emperor, with the order of the Rising Sun, conferred, as the accompanying letter to the American Embassy declared, in recognition of my services to the mining industry of Japan. Since, at that time, I had never seen a Japanese mine or smeltery, it was plain that the services thus generously estimated and rewarded must have consisted of the advice and assistance given by me (with the cordial coöperation of the members of the Institute) to Japanese mining engineers and metallurgists traveling or sojourning in the United States for the purpose of studying American methods and appliances.

Indeed, whether I deserved this distinction or not, it had been fairly earned by the Institute of which I was the representative. One of our members, Benjamin Smith Lyman, of Philadelphia, laid the foundation of the present Imperial Japanese Geological Survey, the work and the publications of which are not surpassed by any other nation. Two others, Raphael Pumpelly and William P. Blake, not only established the first school of engineering in Japan, but also, by way of practical illustration, showed the Japanese miners how to drill and charge a hole, and fire the charge with a fuse. Many other modern methods and appliances the acute and eclectic observers of Japan afterward adopted and adapted in their study of modern mining and metallurgy. And during more than half a century of professional practice I have had repeated proof of the erroneous character of two generalizations concerning the Japanese, to which, for a time, in company with all the other smart critics, I gave assent.

The first of these propositions was that, like other Orientals, the Japanese were able to copy, but not to originate or improve. I could give many interesting instances to the contrary from my professional knowledge. For instance, I could report a discussion which took place during our visit, at one of the largest copper mines in Japan, between eminent American mining engineers and the Japanese manager of the mine. They had copied our American method up to a certain point, and omitted to adopt what we regarded as its most valuable feature. And the visiting critics, having found few opportunities, thus far, for pointing out defects, were quick to seize upon this one. But after a few minutes of clear exposition from Japanese lips they recognized the futility of their criticism, and the fact that what they had mistaken for Oriental superficiality was in reality Oriental patience and thoroughness, rejecting as well as selecting, adapting as well as adopting.

The origin of our delusion on this point is easily discerned. The Japanese nation has passed in 50 years through a transition from feudalism to modern civilization which occupied our ancestors for three centuries. At the beginning, of course, it copied, to save time. So does every beginner. But the Japanese, having cast away their own hampering traditions and adoptetd ours merely as a starting-point, are now bolder than we to question everything; and he who denies their capacity to invent, originate and improve is like one who, having seen a row of school-boys laboriously learning to write, declares them all to be "mere copyists" and refuses forever thereafter to admit that they may have become authors. To the unprejudiced observer the wonder is that those new scholars have passed beyond the copy-book stage so rapidly.

The other generalization which experience has disproved for me is that which attributes superficiality and fickleness to the Japanese. I confess that, for a long time, I was more or less influenced by this tradition. I used to fancy that the Japanese were more mercurial and less reliable than the Chinese; and I accepted as proofs many seeming evidences of temporary fads and fancies in Japan.

Let me say here that I am no strong believer in ineradicable national, or even racial, characteristics. In every continent of the world I have found all kinds of people in every nation, and under every skin a common human nature. In a word, I believe profoundly that both Japanese and Chinese are what we would have become under the same environment. So I am not discussing here the comparative permanent characteristics of races (if they have any—which I doubt), but simply the question whether the modern history of Japan shows the Japanese to be variable of purpose, as we used to think.

There is one overwhelming proof to the contrary, namely, the amazing transformation wrought in Japanese land-tenure, jurisprudence, government and industry, without bloodshed (save for a single brief rebellion, now forgotten) and without social disturbance, during a single human lifetime. When I was in Tokio, four years ago, the last of the Shoguns was still living, and sat contentedly in the Upper House, as a noble of the highest rank, under the rule of his hereditary foe, the Mikado. Such a transformation as that cannot be so peacefully and rapidly effected by a superficial and unreliable nation.

The question is therefore really, not, Are the Japanese fickle? but, How did they ever come to be so regarded?

I think the main source of this tradition has been the wonderful history already mentioned. The amazing modernization of Japan has been too generally accepted as a sort of miracle, and not further analyzed; whereas, in fact, it was a process like that of any other reform, only more rapid and less turbulent than usual. There was always a progressive party, with momentum enough to initiate new steps of progress; and there was always a conservative party, with inertia enough to hinder the immediate prosecution of such beginnings. Ultimately, the party of progress had its way; yet the delay and apparent vacillation effected by the conservatives were by no means an unmitigated public evil. For the enthusiastic progressives, it must be confessed, were sometimes hasty and indiscriminate in their intiative, and a little delay did the country no harm. Yet these seeming changes of policy undoubtedly produced an impression of

national fickleness, though what they really showed was the alternate ascendency of conflicting parties, or the intervention of compromises, by which some proposed reforms were postponed, that others, deemed more important, might be effected without opposition.

I could give instances in the line of my own profession, in which the Japanese Government employed distinguished American experts, paid them high salaries, received their reports and plans with exuberant thanks and compliments—and, for the time being, did nothing more. But I will state only one case, which occurred in the '70s, and was reported to me by a friend, then residing in Tokio, and sufficiently illustrates my proposition.

There arrived in Tokio, one day, the agent of an American company manufacturing steam fire-engines. Tokio, with its long streets of wooden houses, lacking (at that time) any system of water-supply, was peculiarly exposed to the danger of conflagration; and the authorities readily consented to an exhibition of the power of the American engine. This was so impressive that a contract for the purchase of 10 engines was approved; but before the papers had been actually signed, some old public servant said he seemed to recollect that the same programme had been gone through before. And, upon search, there were found in a government storehouse several fire-engines of that manufacture which the progressives years before had had the courage to buy, but the use of which the conservatives, backed, no doubt, by the inertia and superstition of the populace, had been able to prevent.

Now, the alternate preponderance of one or the other party in a national or municipal government is a sign, not of "feebleness," but fighting. And the early and permanent victory of either party shows the temper of a community. Judged by this rule, Japan has shown itself to be exceptionally consistent, as well as persistent, in progress.

Franklin Guiterman

Franklin Guiterman died from pneumonia at his residence in New York, May 2, aged 58 years. He was widely known as an experienced and expert metallurgist, and had held important positions with the American Smelting & Refining Co. ever since its organization.

He was born in Cincinnati, Ohio, studied at the schools there, at Columbia University in New York and at the Bergakademie at Freiburg, Saxony, where he graduated in 1877. For several years he was employed as chemist, assayer and superintendent at mines in Georgetown and Leadville, Colo., and Hartville, Wyo. In 1885 he was superintendent of the Mingo plant of the Pennsylvania Lead Co., at Sandy, Utah. In 1888 he went to Denver as general manager of W. J. Chamberlain & Co., ore buyers and samplers, and later was made manager of the clearing house of the Associated Smelters of Colorado. In 1895 he was appointed manager of the Durango plant of the Omaha & Grant Smelting Co.; in 1900 he became general manager of the Pueblo plant of the American Smelting & Refining Co., and two years later was placed in charge of the Colorado department of that company, adding to the duties of that position those of president of the Carbon Coal & Coke Co. Four years ago he came to the New York office of the company, and besides continuing in certain duties with respect to the Colorado department, he became the head of the research department of the company and also president of the New River Collieries Co. and the Chesapeake & Ohio Coal Co. of West Virginia. He was a member of the executive committee of the American Smelting & Refining Co. and of the American Smelters' Securities Co., and was recognized as a man of marked ability.

Mr. Guiterman was a member of the Colorado Scientific Society and served as secretary and president of the society. He was a member of the American Institute of Mining Engineers and of the Mining and Metallurgical Society of America.

Mr. Guiterman was popular with the miners in his company's employ, and last year, when an explosion in one of the shafts of the New River Collieries mine at Eccles, W. Va., caused a great loss of life, Mr. Guiterman chartered a special train and rushed to the scene, where he personally superintended the rescue and relief work.

He is survived by a widow and one son, Kenneth S. Guiterman, chief chemist at the refinery of the American Smelting & Refining Co., at Perth Amboy.

The Zinc Industry in Japan

YOKOHAMA CORRESPONDENCE

The production of spelter in Japan in 1914 was 4750 metric tons, of which the Mitsui Ohmuta works produced 2950 and the Osaka works 1800. A small production was made experimentally in some other works.

No statistics of the Japanese production of zinc ore in 1914 are yet available, but it is estimated at about 35,000 metric tons, including what was produced in Chosen.

The exportation of zinc ore in 1914 from January to July inclusive was 14,300 metric tons. After the outbreak of the war in Europe no zinc ore was exported from Japan until March, 1915, when about 1000 tons was shipped to New York, which is supposed to be the first shipment of zinc ore ever made to America from Japan.

The importation of zinc, both in the form of spelter and sheet zinc, in 1914 was 4800 metric tons from January to July inclusive and 1000 metric tons from August to December inclusive, a total of 5800 tons for the year, compared with 10,900 tons in 1913.

At the present time the Mitsui Ohmuta smelting works is producing about 400 tons of spelter per month and the Osaka works about 200 tons per month.

Reported in New York

In the reactionary movement in the stock market last week, which culminated in the semi-panic of May 7 when the news of the sinking of the "Lusitania" came, the copper stocks behaved remarkably well. They suffered severe declines along with all other stocks, but rallied upon good buying, the market being full of orders at a few points below quotations.

A movement has been started in northern Mexico to require the payment of wages in mines, mills and smelting works in silver instead of paper money. A conference of mining and metallurgical interests, which was attended by representatives of Villa, took place in New York on May 11 to consider this question.

Correspondence and Discussion

Do Not Buy Zinc Mines Now

Under the caption "Do Not Buy Zinc Mines Now" the ENGINEERING AND MINING JOURNAL in a late issue warned its readers that present prices for both zinc ore and spelter were abnormally high, and that it was advised by its Joplin correspondent that a press bureau was about to be organized in this district for the purpose of exploiting mining properties at high prices, etc.

We believe that this capable and reputable journal did not weigh carefully the unequivocal nature of the statement made in the headline above quoted. Its manifest effort and desire to warn its readers against an era of wildcat speculation either in the stocks of zinc-mining companies which are almost sure to be offered the public, or in the purchase of mining properties outright at inflated values, are most commendable and reiterate the "warning" sent out broadcast by us over two months ago; but the unqualified statement "Do not buy zinc mines now" is tantamount to arguing that people should not engage in any legitimate business during an era of exceptional prosperity.

While it is true that the price of spelter is abnormally high owing to the war, such is not the case regarding the price of zinc ore. With spelter selling at from $12 to $13 per 100 lb. in St. Louis and New York, a fair price for zinc ore in this district would be $100 a ton instead of the $60 to $65 basis for 60% concentrates at which it is now selling.

Of course operators owning good mines here are making large profits even at present prices, and would doubtless want an unusual price for their properties if asked to sell; but such properties are not the only kind of mines open for investment in this field, nor do they offer the best form of investment, as we have repeatedly asserted during the past 15 years, during all of which time we have consistently advised investors that the greatest safety and biggest profits were to be found in proven mines that had not reached the point of production but required capital for development, and where all the ore values were still in the ground. Such properties are to be had in this district, which will make large earnings not only on an unusually high market but on any kind of a market which justifies mining at all.

We therefore think that in justice to itself as well as to this district the JOURNAL should modify its statement, while continuing to lambast every undertaking that smacks of crookedness or wildcatting.

THE LYON INVESTMENT CO.

Joplin, Mo., Apr. 30, 1915.

[Yes, we think that our advice ought to have been qualified in about this way: Do not buy zinc mines now—unless the investment figures rightly on the basis of 5c. for spelter. However, we find it hard to imagine any vender making such a presentation in these days, and it is best to let our advice go badly as we put it originally.

Our correspondent betrays the error in popular ideas when it states that with spelter selling at $12@13 per 100 lb. a fair price for zinc ore in the Joplin district would be $100 per ton instead of $60@65. Not so.

The high price for spelter is due only to shortage of smelting capacity. The spelter buyers of the world are paying great premiums for the use of smelting capacity, not for scarcity of zinc mines or zinc ore. The world is glutted with zinc ore.

The situation is abnormal. Nothing like it was ever known before; and probably never will be seen again. It can be nothing but ephemeral. The termination of the war will explode it, if it be not exploded earlier.

We have noticed in Boston papers the advertisements of brokers advising the public to buy zinc stocks. To advertise thus for the sake of petty commissions is like trying to steal candy from a baby.—EDITOR.]

Protect the Mine Owner

In the JOURNAL of Apr. 24 is published an excellent letter from A. D. Boyd, under the caption "What Is the Matter with Mining?" Mr. Boyd calls attention to the practice of illegally holding possession of mining claims by physical force and the practice of "doing assessment work with a lead-pencil," as it is called in Colorado.

In the mining districts of Colorado and Utah this practice is commonplace. Indeed, it would appear that in some remote settlements the natives imagine they own the environs by some divine right, and by reason of their local political influence seem to receive more than an even break in the local courts.

Against these are the thugs and gunmen, professional claim-jumpers, the flotsam and jetsam of mine strikes, tramps and I. W. W.'s roaming the country in bands of 15 and 20 and ready for any outlawry. The specialty of this tribe is possession through violence first, by stealing the ore stacked up and ready for shipment, by intimidation, by trickery and quibbling, even sometimes with the help of shyster lawyers; the later stage of this tribe is similar to the Nevada outlawry, doing the assessment work by lead-pencil and bolstering up any weak points with expert perjury.

The insolence of these thugs passes belief. Only when in the county seat in consultation with their pettifogger do they make a pretense of any legal or moral right. The poor wife of an old prospector and miner reproached two of these Weary Willies for jumping her husband's claim. They shot back: "Ye're lucky we don't jump your garden." There is not the slightest effort to apprehend these ruffians. What protection had that old man against a roaming band of outlaws? Eventually, he had practically to give away his claims to a big corporation. And yet our present vicious mining laws are presumably framed in the interest of the small mine owner!

The remedy is to repeal our present mining laws and adopt laws similar to those in Peru. Let the Federal Bureau of Mines set the metes and bounds of all mining claims; require a carefully regulated tax paid to the Bu-

reau of Mines twice a year (part of this tax might go to the mining district), and require neither location nor assessment work. This has prevented outlawry, because physical possession of the property was of no value in law. Our present mining laws should be entitled "An Act to Encourage Murder and Fraud."

THOMAS F. V. CURRAN.

Denver, Colo., May 1, 1915.

Taxes in Colombia

The statement about municipal taxation in W. A. Prichard's report on the Pato property in the JOURNAL of Jan. 30, 1915, surprises me very much. My experience during seven years' practice has been so entirely different that I cannot refrain from communicating it to you.

As contractor on the Girardot Ry. I had to retain a lawyer in Bogotá. When I left railroading to start in mining my lawyer recommended me to a friend of his in Ibagué; but I soon found out that I had no need for a lawyer because both municipal and department governments treated me justly. That I am doing pioneer work here may have had an influence. I am the only one in the district risking money in deeper development, in spite of predictions that most of the veins in the department pinch out in depth, and that others carry sulphide ores without free gold below the oxidized outcrop.

Of course, taxes are charged everywhere, but I believe that no country which supports any kind of government taxes mining lower than Colombia. I own at present 51 lode claims (a Colombian lode claim is 600 m. long by 240 m. broad) and one alluvial claim. My tax amounts to just $52, which has to be paid at the national subtreasury at Ibagué by the end of the year. My farm—about 500 acres, half of it in pasture, *maiz,* vegetables, etc., the other half preserved as forest to assure the supply of mine timber—pays a yearly tax of $5 to the municipality. Besides these two—the mine tax of the national government and the land tax of the municipality—there is a road tax, which every grown-up resident, native or foreigner, has to pay. This is the tax of which foreigners are always complaining. But do not we foreigners travel over the roads as well as the natives? The public roads in Colombia have no other source of income than this tax, and this is the cause of the bad state of the roads.

My road tax is $2 a year, and each of my workmen has to pay $1 yearly or do two days' work on the roads. Laborers are only too willing to shirk this small duty, and, as a rule, think that they cannot be taxed while working for a foreigner or a foreign corporation. This tendency of the men to hide behind their foreign boss causes friction between the management of a concern and the authorities.

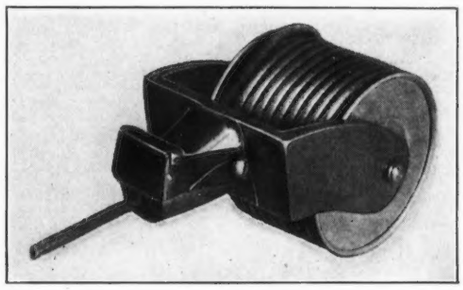
I proceed in the matter as follows: Every year when the road tax is called in the municipal collector sends me a list of those of my men who appear on the books of the tax collector. The men who only started work shortly before do not appear on the books, and the ones who have left are crossed off. After that I find out which parts of the roads are to be repaired. If the road leading to my work is on the repairing list, I send a few spare men every day until all have paid the tax in work. When necessary, I furnish explosives, the value of which is computed into days worked. When the roads in other parts of the district are to be repaired I pay the tax of all of my men in cash and deduct it from their earnings. The law does not oblige me to collect the tax, but this small exertion saves me lots of trouble.

J. FRED DIEROLF.

Ibagué, Colombia, Apr. 8, 1915.

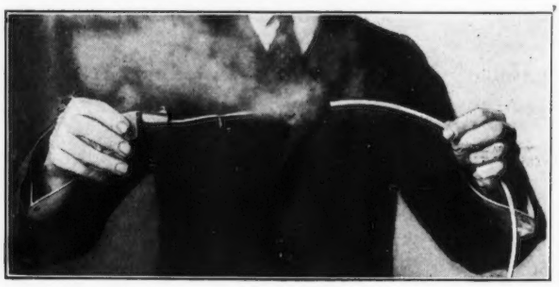
Spitting Fuses

In Correspondence and Discussion in the JOURNAL of Apr. 17, 1915, we notice an item by "Sourdough," Goldfield, Nev., on spitting fuses. We are entirely familiar with the methods which he there refers to, and particularly the one which he recommends—the old-fashioned way of spitting with a piece of notched fuse. It is our observation that this method is still used to a large degree in metal mining and doby work, and we quite agree that it is the most effective method which has been in use until quite recently.



LEAD-SPITTER FUSE LIGHTER COMPLETE

Following out the principle involved in this method, we have recently introduced what we call "Lead Spitter Fuse Lighter," which consists of a core of powder in a small lead tube, which we prepare in 25-ft. lengths on small tin spools which fit into a suitable cast-iron holder, on the feeding nose of which there is a knife which is used to cut off the spitter after the round of fuses has been lighted.



LEAD-SPITTER IN USE, SHOWING FLAME

The operator in using this lighter simply draws out through the nose 12 or 15 in. of the lead spitter and ignites the end of it with his candle or match. It then burns at a steady, slow rate and throws a long spit from the end which easily and quickly ignites the safety fuse in wet weather, wet workings, or under other adverse conditions.

The illustrations show the spitter complete and ready for use and in use.

THE ENSIGN-BICKFORD CO.

Simsbury, Conn., Apr. 27, 1915.

Editorials

The wicked destruction of the "Lusitania" has forced upon us a keen realization of the outlawry that has been produced by the war in Europe. We shall not discuss the feeble excuses for it but only express our horror over this monstrous deed and extend our sympathy to the families of several American engineers who went down with the ship.

World's Production of Copper in 1914

The appearance of the annual copper statistics of Henry R. Merton & Co., last week, excellent in form as usual, but a little more tardy than ordinarily, enables us to present a revised summary of the world's production of copper in 1914. Merton & Co. uses our figures for the United States and some other countries and we use its figures for Australia and the European countries. As between any two compilations of the world's production of copper there are likely to be discrepancies owing to differences in the bases adopted. Thus as to the production of Chile and Peru, there is often a considerable difference between the reckoning based upon the exportation from those countries and the reckoning based upon the arrival of the copper at the smelteries and refineries in England and America. Our own statistics are determined in the latter way.

The revised figures for 1914 are given in the accompanying table. The total is about 10,000 tons larger than we reported on Jan. 9, 1915, but the total is so large

WORLD'S PRODUCTION OF COPPER (*a*)

(In Metric Tons)

Country	1911	1912	1913	1914
United States	491,634	563,260	555,990	525,529
Mexico	61,884	73,617	58,323	36,337
Canada	25,570	34,213	34,880	34,027
Cuba	3,753	4,393	3,381	6,251
Australasia	(*b*) 42,510	(*b*) 47,772	(*b*) 47,325	(*b*) 37,592
Peru	28,500	26,483	25,487	23,647
Chile	33,088	39,204	39,434	40,876
Bolivia	2,950	4,681	(*b*) 3,658	(*b*) 2,743
Japan	(*d*) 52,303	(*d*) 62,486	(*b*) 73,152	(*d*) 68,058
Russia	(*c*) 25,747	(*c*) 33,550	(*c*) 34,316	(*b*) 31,938
Germany	(*b*) 22,363	(*b*) 24,303	(*b*) 25,308	(*b*) 30,480
Africa	(*b*) 17,252	(*b*) 16,632	(*b*) 22,870	(*b*) 24,135
Spain and Portugal	(*b*) 52,878	(*b*) 59,873	(*b*) 54,696	(*b*) 37,099
Other countries	(*b*) 26,423	(*b*) 29,555	(*b*) 27,158	(*b*) 25,176
Totals	886,855	1,020,022	1,005,978	923,888

(*a*) The statistics in this table are our own compilations, except where specially noted to the contrary. (*b*) As reported by Henry R. Merton & Co. (*c*) As officially reported. (*d*) Privately communicated to us from Japan.

that this is only about 1% of it. It is indeed satisfactory that the production of copper, the conditions of which are quite complex, can be reported within 1% only a few days after the termination of the year reviewed.

The revised statistics show that in the January report the output of the United States was understated, while that of Spain-Portugal was overstated by about the same amount. The United States is the largest producer of the world and its copper industry is the most varied and complicated. Moreover, the latter part of 1914 was a troubled time, rendering the collection of statistics more difficult than usual. The reporting of the statistics for Spain and Portugal ought to be relatively easy, but this has not yet been organized so well as for most of the other important copper-producing countries.

As for the other countries of the world, the final figures reported in May are so little different from the preliminary figures reported in January that no special comment about them is now necessary. There was an important curtailment of the world's production of copper in the aggregate in 1914, which we now know to have been more than was really required. With the state of mind, of finances, and of all the industrial machinery of the world last August, however, there was probably nothing else to be done than what was done.

Affairs in Mexico

In Mexico at the present time there is no national government. The country has become divided into palatinates. Villa rules one, Zapata another and Carranza the third. In certain districts smaller barons prevail. Anybody seeking to do business in Mexico must make arrangements with the rulers of the respective sections. No one of them is strong enough, or intelligent enough, to establish good order, and crime is rife, but on the whole the natives appear to get on very well.

At present the currency question is exercising the several rulers, especially Villa. Gold and silver have been driven out of the north of Mexico, which is now on a paper basis. Villa is anxious to restore payments of wages in silver and has issued an edict to the mining, milling and smelting companies to that effect. The company managers are disturbed over what may happen if they pay their men in silver while Villa pays his soldiers in paper.

The Price for Spelter

A correspondent inquires of us why we quote the spelter market with a wide range, why we do not simply quote the spot price, and if we do not do an injustice to miners who sell their ore on the bases of our quotations.

We quote spelter according as it is sold, which, in so far as the bulk of the product is concerned, is on contracts for delivery ahead. The term "spot" spelter has no meaning of consequence except with respect to relatively insignificant speculative business. The great tonnage of spelter goes into consumption quite otherwise.

However, the matter of delivery is not open to discussion, inasmuch as we have repeatedly stated during many years that we quote the metals as ordinarily sold, regardless of time of delivery. Lately we have quoted the spelter market with a wide range for the reason that there has been such.

Our quotations for spelter during the first four months of 1915 were based on reports of sales aggregating upward of 50,000 tons, and the checks between selling averages and quotational averages were very close.

A large producer of zinc ore recently discussed the situation of the spelter market with the buyer to whom

his ore was contracted on sliding scale. The buyer showed that his sales of spelter had fallen short of realizing the quotational average and offered to tear up the ore contract and sell for the miner on commission or let him go elsewhere with his ore, as he saw fit. The miner did not want to do either.

We quote the spelter market just as it is and as we see it. If anybody has an ore contract based on our quotations and is dissatisfied we recommend that he ask the buyer to cancel the contract and arrange matters otherwise. Some ore buyers at least have found recent conditions rather hard to face and probably would not be averse to being released from terms which the recent events in the spelter industry have made both onerous and dangerous.

Offering Ore for Sale

The question of selling the product of the mine is a most important one, but one to which the average miner gives little thought. The general feeling seems to be that any intrinsically valuable product must sell itself. From the standpoint of the neutral observer the wonder is that some of the miners ever sell anything.

A few days ago the following letter was shown to us by a great metal-buying house: "Dear Sir—I am mining ores. I wish you would give me prices paid and market conditions for minerals. Yours very truly, etc." There are, it is believed, better ways of writing such letters.

In the first place, if possible, send a sample of the ore or metal offered for sale. In the letter, state tonnage available, analysis, physical condition (lump or fine, wet or dry, etc.), and delivery. And make these statements exact. There is no use getting a firm offer on a 5000-ton shipload of bat guano and later showing up with fifty 100-lb. sacks, and expecting the same price. It can't be done.

Another point is, if competing bids are received—and these vary widely—don't immediately call the sender of the lower bid a pirate. It may be that his works are overstocked with what you have to offer and the other bidder's works are bare of it. Another time the conditions might be reversed.

There is probably no large metal buyer who does not realize keenly that every enemy he makes is a liability, and that every raw deal put over by him would be one more producer who would never come back. Inasmuch as most of them are in business to stay, a reasonable degree of fairness is forced upon them by necessity.

Oversupply of Labor

There is an enormous oversupply of labor in the northern sections of the country. Official warning has gone out from Butte that the city has a large number of unemployed; and although the mines are running at almost full capacity and times are prosperous there, the unemployed element is numerous and there is no opportunity except for skilled labor. A similar warning is being sent out from the Lake Superior copper country, for the renewed activity and increase in wages is attracting a great number of men who are finding hard times there in the midst of apparent prosperity. Many of these men have come to the Lake country from the Michigan and Minnesota iron ranges, where operations have not yet been resumed to capacity. In one of the iron-mining districts recently 1000 men were put to work in one week, without apparently decreasing the labor supply at that point. Most of these laborers are unskilled, which emphasizes the fact that although the mining industry has experienced a wonderful recovery, due to war orders, the general prosperity of the country at large, otherwise than that influenced by war conditions, is still at low ebb. An official estimate gives the total unemployed in New York City at the present time as almost 400,000 persons.

Magnesium—Another Temporary Rarity

The course of magnesium prices is another unlooked-for result of the present war. In former times of peace the price of this metal was about $1.50 per lb., with a plentiful supply. Partly due to cutting off the German exports of the metal; partly due to smaller supplies of magnesium salts, since these also were received largely from Germany; partly due to the tremendously enhanced demand for the metal as a material for flying-machine parts, the price steadily advanced, until in one case, we believe, $7.50 per lb. was paid for spot metal.

As matters now stand, quotations can be had all the way from $3.50 to $6.50 per lb., but when one begins to talk delivery under these terms one finds that $3.50 apparently secures delivery 90 days after a treaty of peace, and $6.50 secures it at seller's convenience.

At the present time it would appear that buyers in and around New York could absorb 10 to 15 tons of the metal and that total spot supplies do not exceed 200 or 300 lb., with those small quantities being jealously guarded against a day of really high prices.

The Case of Leonard Worcester, Jr.

As a result of the efforts made by technical men on his behalf, Leonard Worcester, Jr., has been freed on bail. In a letter to the JOURNAL under date of May 2 he says:

"I was released on bail in the sum of $1000 on Apr. 21, and I believe that my release was due to the representations made to the Villa authorities by the State Department, which was impelled to these efforts by the publicity given my case in the JOURNAL and the press in general and the pressure exerted by you and my friends upon the Department."

We are glad, of course, that Mr. Worcester is free, and we sincerely hope that there will be no occasion for other efforts of a similar nature. The Mexican authorities gain nothing by senseless attacks on American citizens and interests.

Several brands of high-grade or intermediate spelter are now being offered, which the sellers claim to be practically the same as "Horsehead," these new brands being made by redistilling common spelter, zinc dross, etc. This subject was discussed in an editorial on "The Kinds of Spelter" in the JOURNAL of Feb. 6, 1915. The matter of high-grade spelter is an interesting one at the present time, the output of the New Jersey Zinc Co. being insufficient to supply the demand of the Allies for cartridge metal. The maximum limits of impurities in high-grade spelter are 0.07% lead, 0.03% iron and 0.05%

cadmium, the total to be not over 0.10%, which means a zinc content of 99.9%. We hear, however, that several brass manufacturers have been satisfied with a slightly lower percentage of zinc, namely, 99.75%, the impurities being about 0.10% lead, 0.02% iron, and 0.12% cadmium. Such a spelter is in purity far above the minimum limit of intermediate, except in the matter of cadmium content, and save for the latter is not far below the standard of high-grade.

BY THE WAY

The proposed indictment of the Allis-Chalmers Co. in Wisconsin for conspiracy to commit murder, on the ground that it is manufacturing deadly missiles, is a novelty in law, and it is almost impossible that it can be maintained—although law has some queer kinks in Wisconsin, and elsewhere. If the proceedings should be sustained it looks as if they could put an end to war by going back to the source and overhauling some conspicuous offenders—the Krupps in Germany, for instance, and the Armstrongs in England. For that matter the United States Government is one of the greatest sinners of all in this country, since it is the largest producer of death-dealing implements. And then let's go back to the original sources of trouble and indict the miners.

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The enormous inquiries for copper, lead, spelter, etc., attributed to foreign governments and reported in the Wall St. journals are not always to be taken at full face value. There have been cases of such alleged sales being made and the copper going into warehouse. Later it developed that the copper had not been bought by Russia, but by some wily speculators, who subsequently resold it at a profit. The war orders and the quasi war orders have introduced in the metal trades many persons previously unknown, who are not always to be taken seriously. One of these recently called upon a lead producer and stated his business thus: "I represent the —— government. I want to buy 25,000 tons of lead for immediate delivery. What is your price?" The lead producer replied: "I'll have to consider this before I can quote you a price. I do not suppose there ever was such an order for lead in the history of the world." The inquirer did not come back. We have heard of a 10,000-ton transaction in lead, and there may have been larger ones, but the dealing in such blocks is not common. Of course there are contracts over long periods that run into larger quantities.

⁂

The New York Metal Exchange is a curious institution. It has a high-sounding name, but in fact neither the important producers nor the important consumers of copper, lead or zinc are represented on its floor. However, there are some persons who frequent the room and apparently derive some amusement out of vociferously making bids and offers so long as there is nobody on hand to take them up. Not long ago when spelter was being bid up to an extravagant figure a producer instructed a broker to sell some for his account. This was done, but when the buyer was requested to put up margin according to the rules of the exchange he did not want to do so. There being no "binder," the trades were canceled. Bids and offers were made more cautiously for a while, but soon they began to appear again. A producer once more instructed a broker to sell 100 tons for each delivery at the price bid, and if unable to sell at the price bid to offer the same quantities at ¼c. less. When it appeared that there was somebody present who was willing to sell, the previously reckless bidders drew into their shells, and when offers to sell at lower prices were made there was nobody who wanted to buy.

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The "Lusitania" Losses

The heavy toll of American lives taken by the sinking of the "Lusitania" last week included several engineers and others connected with allied industries.

Perhaps the most notable loss was that of Frederick Stark Pearson, of Boston and New York. He was 54 years old, born in Lowell, Mass., and a graduate of Tufts College. After some years as an instructor he was engaged as a mining engineer in the United States and Brazil, but from 1890 on he was chiefly occupied in electrical work, except for a few years after 1893, when he was engaged in developing coal mines at Cape Breton and in organizing the Dominion Coal Co. and the New England Gas & Coke Co. He was chief engineer of the Metropolitan Street Ry. Co. in New York, and for years past had been consulting engineer of many large railroads and power enterprises.

Carlton Thayer Brodrick, Harvard, 1908, who was one of the passengers, was a son of Alfred H. Brodrick, president of the Chadwick-Boston Lead Co., was 28 years old and was graduated from Harvard University in the class of 1908. He had been for four years a mining engineer in the employ of an English company operating a Siberian concession and was on his way back to Russia after a vacation of several weeks spent with his parents.

With him was Richard R. Freeman, Jr., of Wollaston, who was 29 years old and a member of the Harvard class of 1909. He took a post-graduate course and then went West to follow his profession of mining engineer. He was in the employ of the company for which Mr. Brodrick worked and was accompanying him to Siberia.

A dispatch from Queenstown dated May 10 says that Lindell T. Bates, son of Lindon W. Bates, of New York, vice-chairman of the American Commission for the relief of Belgium, was arrested at Kinsdale May 9 on a charge of espionage while searching for the body of his brother, Lindon W. Bates, Jr., who also was on the "Lusitania." Newton B. Knox, an American mining engineer who was with Mr. Bates, was taken into custody at the same time. The sergeant who made the arrest accused them of being officers of a German submarine. After being taken before a captain, they were detained at the barracks a half-hour until United States Consul Frost at Queenstown vouched for their innocence. Their search of the coast revealed no trace of the body of L. W. Bates, Jr., who is now given up as lost. He was a civil engineer, a graduate of Yale, a traveler and author of note, and was an intimate friend of H. C. Hoover, with whom he was closely associated in the Belgian relief work.

Among the other passengers lost was Isaac V. Trumbull, head of the Trumbull Brothers Manufacturing Co. at Plainville, Conn., large manufacturers of electrical and mining machinery. W. S. Hodges, for many years with the Baldwin Locomotive Works, of Philadelphia, was also lost.

PERSONALS

Arthur Thacher, of St. Louis, has been in Denver on business.

J. V. N. Dorr, of New York, will be in Denver during the month of May.

J. A. Houser, of the zinc mines at Mascot, Tenn., has been in St. Louis on business.

W. Rowland Cox has removed his New York office to the Equitable Building, 120 Broadway.

H. R. Lyman, manager of the Seneca Superior mine, has returned to Cobalt, Ont., from Florida.

Kirby Thomas, of New York, has been for several weeks in Virginia and Tennessee, examining iron and zinc properties.

G. L. Sheldon, of Ely, Nev., recently spent two weeks in Lander and Humboldt counties, Nevada, on professional business.

Frank H. Sistermans, of El Paso, Tex., is leaving for South America on professional business and expects to be absent for several months.

H. W. Hardinge has left New York for an extended trip to the West and Alaska. Mr. Hardinge expects to be gone about six weeks.

C. H. Palmer, Jr., and Frank A. Keith, of Los Angeles, Calif., are inspecting the United Eastern Mining Co.'s property at Oatman, Arizona.

Andrew W. Newberry, of Los Angeles, has left for a trip into central Alaska on professional work. He will probably remain until next winter.

Capt. A. M. Daniels, manager of the Lumsden Mining Co., Cobalt, Ont., who went to the war as an officer of the 48th Highlanders, is reported missing.

Lloyd B. Smith of the Associated Geological Engineers has returned to Pittsburgh, after spending three months in the oil fields of Mexico and Central America.

Guy V. Morton, manager of the Aspen Sampling Co., and Charles E. Anderson, manager of the Smuggler Leasing Co., Aspen, Colo., have been in Denver on business.

C. Herbert Poirier, manager of the Vipond mine, Porcupine, Ont., was married to Miss Grace Barber at Toronto, Apr. 30. They went to Ottawa Valley for their honeymoon.

January Jones, who shipped the first ore out of Goldfield and at one time was Goldfield's most extensive operator, has opened offices in Reno and will operate in Virginia City.

Will H. Coghill, after seven years in the practice of ore testing in Chicago, has removed his laboratory to El Paso, Tex., where he will continue in the same line of work.

John H. Hall has discontinued his practice as consulting engineer, and on May 1 became associated with the Taylor-Wharton Iron & Steel Co., High Bridge, N. J., as metallurgical engineer.

Charles Camsell, of the Canadian Geological Survey, will have charge of a party which will leave next month to make an examination of the new Fond du Lac silver field in Saskatchewan.

J. A. Buissen, formerly on the mining engineering staff at the Consolidated Mining & Smelting Co.'s Center Star group of mines, Rossland, B. C., is now with the Mines Branch, Department of Mines, at Ottawa.

W. D. Crawford, president of La Belle Iron Works, Steubenville, Ohio, has resigned. R. C. Kirk, secretary and treasurer of the company, has been elected to the presidency and to the directorate to fill the vacancy.

Dr. R. B. Moore, in charge of the Denver branch of the U. S. Bureau of Mines, delivered a popular lecture, Apr. 27, on the occurrence and uses of radium, under the auspices of the Tuesday Reading Club, Central City, Colo.

Captain Arthur Bennetts of the Quincy copper mine in Michigan resigns to accept a position as head captain at the Mass mine, succeeding the late Captain W. L. Ninness, killed a month ago. Captain Bennetts, while a comparatively young man, is one of the best mining men in the district.

Dr. Lucien I. Blake, of Boston, has concluded a series of lectures, given on successive Monday evenings in Denver, under the auspices of the Teknik Club. The course was exceptionally interesting as it presented in non-technical language the latest discoveries and theories regarding astronomical phenomena and cosmic physics.

Bradley Stoughton, of New York, secretary of the American Institute of Mining Engineers, was the guest of honor at a luncheon given by Charles W. Goodale at the Silver Bow Club in Butte, May 4. After luncheon Mr. Stoughton visited the North Butte, the Butte & Superior mines and the School of Mines and left Butte in the evening for San Francisco.

At the International Smelting Works, Tooele, Utah, several changes were made on May 1, in the operating department. A. B. Young, formerly head of the testing department, is now superintendent of blast furnaces; B. L. Sackett, who was chief chemist, is head of the testing department. Carlos Bardwell has been promoted to chief chemist. At the general offices, J. D. Wood has been made cashier; E. L. Sowerwine, chief clerk; and A. D. Hunter, assistant clerk. R. H. Page is in charge of the new time office.

The degree of D. Sc. (Honoris Causa) was conferred by the University of Alberta, Edmonton, Apr. 28, on W. F. Ferrier, mining engineer and geologist of Toronto, in recognition of his many years of work in mineralogy and practical geology. Mr. Ferrier is well known for his field work in western Canada and the United States, his work as an officer in the Geological Survey of Canada and for his interest in museum work. He has contributed largely to the Geological Museum collections at the University of Alberta and has assisted in arranging the museum collections.

A. E. Guy, chief engineer of the pump department of the Providence Engineering Works, has been in Leadville, Colo., the past two weeks installing new centrifugal pumps in the Penrose shaft as part of the Downtown pumping project. April 22, he delivered an open lecture in the Elks Opera House on the history of centrifugal pumping. May 1, he gave the same lecture in Denver before the Colorado Scientific Society. Later still, he repeated it in Leadville before the members of the Colorado School of Mines senior class who are on their extended inspection trip preceding graduation.

With Secretary Lane's approval, Director Smith has designated H. D. McCaskey as geologist in charge of the Division of Mineral Resources of the U. S. Geological Survey to succeed Mr. Parker. Mr. McCaskey brings to his new position experience, not only as a geologist of the Geological Survey since 1907 and section chief since 1912, but also as a mining engineer in the Philippine Mining Bureau from 1900 to 1903, and as chief of that bureau from 1903 to 1906. Mr. McCaskey will also continue his work upon the metallic resources of the United States and another geologist will be designated to take up the coal work specialized on by Mr. Parker.

Secretary Lane has accepted the resignation of Edward W. Parker of the United States Geological Survey, statistician in charge of the Division of Mineral Resources and for many years the Government coal statistician. Mr. Parker leaves the Government service to accept a responsible position with the anthracite mining companies. In transmitting his resignation Director George Otis Smith goes on record as expressing his regret both personally and as a public official at "this termination of Mr. Parker's long and efficient service. As coal statistician of the Government since 1890 and as chief of the Division of Mineral Resources of the Geological Survey since 1908, Mr. Parker's contribution to the present standard of the annual report 'Mineral Resources' has been large and important. In the nature of public service should also be mentioned important work by Mr. Parker in studies of coal testing and conservation and the publication by him in the engineering press of many papers on coal mining and production. From his own standpoint, however, Mr. Parker is to be congratulated in his new connection with the anthracite coal interests, where he will continue his activities along lines on which he has long been regarded as authority." Mr. Parker also rendered valuable service as a member of the Commission which settled the great anthracite strike of 1902.

OBITUARY

Samuel Jones died at Chico, Calif., May 1, aged 84 years. He was born in Canada but went to California when a young man, being successful there as a miner and farmer. He was also concerned in mining in Mexico.

Thomas J. Watson, of Toledo, Ohio, died in Chicago, Apr. 28, aged 73 years. He was born in Ohio and began life as a storekeeper, but was one of the pioneers in the oil business in Ohio. He was president of the Craig Oil Co., which he organized 25 years ago.

R. H. Fagan, a prominent Duluth mining man, committed suicide in his office in that city, Apr. 26, having been in ill health for some time previously. He owned a large interest in the Section Thirty mine on the Vermilion Range; also much undeveloped mining property and timber lands.

Editorial Correspondence

SAN FRANCISCO—May 5

The Hawk Oil Claims in Kern County have reverted to the United States upon a decision recently rendered by the Secretary of the Interior. The property has been a large producer of oil, and the land office at Los Angeles a year ago found the petitioners entitled to patent. But the present decision reverses the former and holds that the Pacific Midway Oil Co. did not diligently prosecute the work of exploration for a period of six months.

New Comstock Ore from the 2650 level hoisted on Apr. 28 is the first ore that has come from below the 2500 level in the past 30 years. This came from the north side of the Union first crosscut and the 12 tons hoisted assayed $13.65 per ton. The water is being steadily lowered and it was expected to have the workings down to the 2700 level cleared by May 1. This find of ore below the 2500 level was expected by the management of North End Comstocks, and it was this belief that induced the expenditure of money for the unwatering of the lower levels of the Mexican, Union, and Sierra-Nevada. The fact that the early-day management deepened the mines without exploring the possible orebodies did not discourage the present management, as the existence of such bodies was known, though their extent could only be surmised, and as to their value there was no way of learning except to clear the water and prospect.

A Department of Petroleum and Gas of the State Mining Bureau, provided for by Senate Bill No. 916, introduced by Senator Maddux, will be created. The bill passed the senate unanimously and only one opposing vote was recorded in the assembly. This is the provision for state control of the regulation of oil and gas wells respecting protection from waste and destruction through improper operation. The work of the department will be performed by an appointee of the state mineralogist, to be designated as state oil and gas supervisor. The supervisor will appoint deputy supervisors and other necessary assistants. The work shall be done with a view to advising operators as to the best methods of protecting oil and gas sands and aiding supervisors in ordering experimental and repair work. Data collected and filed in the offices of the field deputies will be open to inspection of persons authorized by operators and state officers. Funds are to be provided by a tax upon operators and owners of oil and gas wells and lands. It is expected the governor will approve the bill.

BUTTE—May 6

The Section Tributary to Twin Bridges has taken on a new lease of life, and indications are that there will be much development work done on some of the promising claims during the coming summer. Work has begun on the Bielenberg & Higgins mines in Bear Gulch and a contract has been let for 300 ft. of additional tunnel on these claims. In the Silver Star district the American mine is being worked by leasers who have struck a vein of good milling ore of considerable extent, running between $10 and $20 in gold per ton. The Iron Rod mill is included in the lease, and will commence to treat the ore in a short time. Development work is also being done in Hulburt Cañon on the Lester claim.

Activity in Helena Mining District is due to the efforts of the Helena Mining Bureau, which has brought the district to the attention of investors in all parts of the country and within the last month a dozen large concerns or individuals have had experts looking over the field. Negotiations are now pending for the development of several properties in the district by large firms and they are expected to come to a head within the next six weeks. The Scratch Gravel district is going ahead. The Valley Forge is doing considerable profitable work. The porphyry dike in the Rimini district is being profitably exploited; across the Missouri River near York two properties are operating and at Marysville the Piegan-Gloster mines of the Barnes-King Development Co. as well as several other properties are ready to begin work as soon as the electric power reaches the camp, probably within the present month. The Helena Mining Bureau is doing considerable development work on its Blue Bird mine in Scratch Gravel district and at the Hawkeye group in the southeastern part of Helena. At the latter mines several tons of ore have been extracted and shipped which ran from $11 to $48 to the ton.

The Butte Duluth Receiver has sent out the following notice:

Since the first of August, 1914, the Butte Duluth Mining Co. had been operated under an arrangement with its laborers, whereby one-half of the payroll had been paid in cash, and the remaining one-half in the form of due-bills to become due at a later date not specified. The business depression continuing longer than had been expected, the delay in resuming full payment of the payroll caused some of the workmen to become restive, and they were on the point of placing liens on the property to secure their claims. Owing to this state of facts it was deemed advisable to place the company in the hands of a receiver, until its affairs could be arranged, and all creditors be paid in full without further complications. Upon the appointment of the receiver, some of the workmen consulted an attorney who advised them to file a petition in bankruptcy against the company, which latter has been done, and the cause is now pending in the Federal Court. It is recognized by all the local creditors that this course will be adverse to the best interest of all creditors, as owing to the fact that there is a bond issue of $500,000 secured by a mortgage on the property, it would require at least that amount to handle the property at a forced sale, which figure makes it improbable that there would be much left to distribute to the creditors. All the largest creditors are located in Butte, and on advice of counsel have signed the petitions. If it meets with your approval we would be pleased to have you sign and return both petitions. Will state for your information that the property represents a value well in excess of all obligations, and if the company is permitted a reasonable time will doubtless meet all obligations in full. Negotiations are now being carried on in the East looking to this end, in order to gain the time necessary to accomplish this purpose it will be necessary to prevent action on the petition until the complaining, as well as all other creditors' interests can be fully protected.

Decision Handed Down by Judge Bourquin of the Federal Court May 1, in the suit against the Anaconda provides that the Alice mining property sold some time ago to the defendant company shall again be offered for sale. The decision holds that the majority stockholders had a legal right to sell the property to the Anaconda company, and that the sale was legally conducted, but adds that the price paid may not have been adequate and that the minority stockholders have a right to be paid in cash instead of Anaconda stock if they so elect. The Alice mine has been worked for silver in the early days of the Butte camp. These operations finally failed and the company was in debt, its plant destroyed, its mines closed and flooded; an expense and unprofitable for about 17 years next prior to the sale. This sale was authorized by the majority stockholders and executed to the Anaconda company for a consideration of $1,500,000. The court's decision states that there was a question as to whether this was the highest price to be obtained, and that the minority stockholders have the right to have this determined by an offer of the property at public sale. The court holds that the majority could lawfully sell Alice, but that the minority's right was a fair sale for money to the end that each should receive in money the value of his equity in Alice property. The original sale is not unconditionally set aside, but unless the property can be sold for more, the interest of all the parties thereto require it shall not be disturbed. As a result of this decision, work at the Alice mine was suspended May 4. The Anaconda company had recently undertaken to repair the shaft to a depth of 300 ft. and it was intended to explore the property for zinc as well as for copper ores. As soon as matters are straightened out in accordance with the court decision, work will be resumed.

DENVER—May 7

Oil Flotation is promised in the Silverton district. The American Oil Flotation Co., recently organized, has leased and will remodel the Silver Lake mill to handle ore from leases on the Mayflower, Slide and Terrible mines. This company also controls the Champion group on Sultan Mt. and the Ben Butler group at Animas Forks. Mr. D. L. Thomas, formerly with the Butte & Superior company, Butte, Mont., is chief engineer and metallurgist.

Grade of Cripple Creek Ores is advancing, this being accounted for by general improvement with depth. Figures in support of this assertion are prepared by E. F. Smith, manager of the Golden Cycle mill at Colorado City who has statistics beginning with the first of 1913. These show that his company, in 1913, handled ores having an average value of $16.25 per ton. In 1914, the average value per ton was almost $19, while during the first three months of the present year, this average has been over $25. It is admitted that the rich

Cresson ore boosts this latter average but it must, nevertheless, be included. Another evidence of the improved tenor of ore shipped from this district is found in the increased tonnage shipped to smelteries, it being borne in mind that only higher grades can stand smelting charges. The American Smelting & Refining Co. received about 5 per cent. of the district's production two years ago but it now receives at least 8 per cent. and this proportion is also based on a much larger tonnage.

Total Metallic Production of Colorado for 1914 was compiled by Thomas R. Henahan and made public April 29 just prior to his withdrawal from office as state commissioner of mines in which office he is succeeded by Fred Carroll. According to these statistics, annual gross production was about $34,250,000, exclusive of tungsten, vanadium and other rare metals. This figure is slightly less than the corresponding production for 1913, the difference being accounted for by the decreased prices of metals. The increase in gold nearly compensates for the decreased production of the other metals. The gold ores produced were both greater in tonnage and of higher grade. The aggregate tonnage of ores of all kinds was substantially greater in 1914. Because of the increased interest now manifest in mining as well as because of the higher prices of base metals, he believes the 1915 production will run above $40,000,000. Teller County (Cripple Creek) is credited with 57% of the 1914 gold production while Lake County (Leadville) produced 45% of the silver. Gross production of tungsten and vanadium is estimated at $1,000,000.

SALT LAKE CITY—May 6

The Utah Copper Co. has received from Salt Lake County a refund of $31,790, this amount comprising excess taxes, costs and interest. The company some time ago brought suit for $35,000 alleged excess taxes, paid under protest, and was by the Federal court here awarded $29,000. The county appealed the case, which was retried by the circuit court of appeals, which rendered a judgment of $27,000. The March output of the company is given at 10,200,000 lb. copper.

The Name of Goldstrike has been given to the Bull Valley mining district in Washington County, 38 miles south of Modena. At present there is a good deal of activity there. The Goldstrike Mining & Leasing Co. is doing work on the Hamburg claim, where it is operating a three-stamp mill. A shipment of gold bullion will be made to Salt Lake soon. This lease is reported to have produced $10,000 or $12,000 in six weeks. The La Vore Gold Mines Co. is driving a tunnel; work is being done on the claims of the Bee Bee Gold Mining Co. The Red Bull Mining Co. will soon begin work on the Evans group of claims east of the Hamburg. The camp now numbers about 1000, with more coming in.

A New Mill to Treat Tailings will be built at Atkinson, seven miles north of Park City. More than 800,000 tons of tailings accumulated here from the various Park City mills between 1875 and 1905 were purchased a year ago by the Big Four Co. Tests have been in progress to determine the best method of recovering the zinc, lead, silver, and gold. Straight concentration has been decided on as most satisfactory with a minimum outlay of capital. The mill has been designed by Kirk & Leavell of this city, who will have charge of construction. The capacity will be 150 tons daily. Tables and vanners will be used. There will be a tube mill to regrind middlings. The tailings run in the neighborhood of $5 a ton, the value being about equally divided between zinc and lead-silver.

SEATTLE—May 5

Quartz Mining in the Fairbanks Creek District has taken a distinct boom as a result of the erection of the Heilig custom mill. The first run was on 14 tons from the Mizpah claim and returned $81 a ton. The Mizpah is developed by an 85-ft. shaft and about 75 ft. of drifts; it is owned by Thompson, Gius & Hess. The mill crushed the 14 tons in 18 hours, which is a good showing for the small Huntington. Other lots of ore to be milled as soon as possible include 25 tons from the Goyette & Ward property; 30 tons from the Hoover workings on the Helen S. claim; 25 tons from the Cook Bros. property; 25 tons from the Pioneer vein; and 150 tons from the Huddleston-McNeil mine.

Larger Alaska Tin Output is expected this year as a result of renewed activities of tin dredgers in the territory. The Union Construction Co., of San Francisco, which has a dredge operating on Buck creek, is expecting to take out practically double what it did last year. The American Dredge Building & Construction Co. has during the winter constructed, at a cost of $150,000, three dredges for the American Tin Can Co., of Portland, which are now being shipped into the York district where the company has 37 claims. The American Gold & Tin Dredging Co., and the York Tin Mining Co., which own extensive property in the Hot Springs district, are preparing to open up their ground on a large scale. The American Tin Plate Co. has had three dredges constructed for the handling of the tin in the Nome district, making a total of five dredges this company will have working this summer in that district. The dredges are equipped with double flumes so that no time will be lost in cleaning up; a special device to separate the fine particles of gold from the tin nuggets being installed. Some samples of tin ore found on a stream last summer between Fairbanks and the Iditarod showed excellent values and the discoverers have announced that fuller investigations will be made this year with a view of installing a dredge. The largest production is expected from the Nome and York districts though considerable will be brought out from the Hot Springs district. In the latter district production is necessarily slow on account of the frozen gravel in which the tin lies but the values run in such large quantities that it is expected more operators will be busy there this summer.

JUNEAU—May 1

That Every Saloon in Southeastern Alaska will be put out of business is freely predicted. A census will be taken of every male and female resident within two miles of any saloon district and at an election to be held May 24 there must be cast a vote, which will constitute a majority of those enumerated in the census, in favor of the saloons, or else the latter will have their licenses rejected. In other words, all persons not voting at the election May 24 will be counted on the side of the "drys."

HOUGHTON—May 8

More Men are Employed in the mines of this district than before the strike, 15,000 being on the payroll which will amount to over a million dollars a month, the biggest payroll in the history of the district.

An Influx of Workingmen into the Michigan copper country just at this time is unfortunate. But the stories of the renewal of operations at the copper mines, the full-time tales and the increases in wages voluntarily announced by the mining companies have been so generally printed all through the country that every train is bringing in more and more workingmen. Large numbers of these are incompetent. Larger numbers come from the iron-mining districts, where conditions have not picked up as they have in this mining section. The truth is that while the mines here are today employing more men at better wages than ever before in the history of the district there is no opportunity for the inexperienced miner. Neither is there any chance for the preacher of red anarchy. And unfortunately there are many men who are here without jobs and without the price to get out of the district and some of them are going from door to door seeking food.

GALENA, KAN.—May 1

The Promoter Company is operating the New Century ground which is developing into one of the best in the Galena district. Since the water was removed a few months ago there have been several mines started and many of the richest strikes in the district have been made on that ground. The filling of the drift under Main St. has commenced. The work of removing a large pillar from under the street has just been completed by Williams & Co., who contracted to pay for the refilling if permitted to remove the pillar. A drill hole has been put down and the filling is being put through it. City Engineer Ricksecker is overseeing the work. This will be a decided improvement to the street at this place and will be without expense to the city. The ground will be safe permanently after it is filled with gravel, it is believed. The pillar was rich, having assayed 22% lead as it was hoisted from the ground; $7000 was realized from it.

TORONTO—May 2

A Process for Making Steel in the electric furnace direct from magnetic iron ore is being experimented with in Ottawa for which tests the Canadian Parliament has appropriated $10,000. The experiments are being conducted by the Mines Bureau.

The Importance of the Mining Industry in Ontario is indicated by the annual statement by the Government for 1914 which shows receipts by the mining bureau of $196,103, as follows: Mining leases, $16,469; Crown leases, $40,755; miners' licenses, $34,160; miners' permits, $860; miners' reading fees, $29,174; miners' royalties, $74,685.

The Reservation of Mining Rights on the lands granted to the Grand Trunk Pacific Ry. has been cancelled by an Order-in-Council issued by the Canadian Government. The lands had previously been withdrawn from mining entry in order that the company might not be embarrassed in the construction of the road. The road being now completed, the company takes over the land grant with mining as well as surface rights.

The Mining News

ALASKA

ALASKA-GASTINEAU (Juneau)—Duplicate of big Nordberg air compressor already in use will be installed at portal of Sheep Creek adit. Will be driven by 540-hp. G. E. motor and will have displacement of 28,000 cu.ft. of air per min. Capacity of two machines expected to be sufficient for daily output of 12,000 tons of ore from mine. The Gastineau company will also start work soon to develop 12,000 hp. of hydroelectric power from Annex and Carlson creeks. Lake at head of Annex Creek will be tapped this summer and will yield 4000 hp. Eventually a large concrete dam will be built and water power developed to capacity.

ARIZONA

Cochise County

MASCOT COPPER (Dos Cabezos)—Will soon finish construction of Mascot & Western Railroad which run from Wilcox, Ariz., to Mascot townsite. President of company states that it has approximately 1,500,000 tons of copper ore blocked out and will begin shipping to Copper Queen smeltery about 200 tons per day as soon as railroad is finished.

Gila County

MIAMI (Miami)—Trial of Minerals Separation suit in Delaware for flotation infringements entered its seventh week.

OLD DOMINION (Globe)—Has advanced wages on sliding scale with copper advances. Affects 1000 men. April production 1,300,000 lb. copper.

SUPERIOR & BOSTON (Globe)—Is employing about 100 men; continues shipments of copper ore to El Paso smeltery. Force of employees is being increased.

IRON CAP (Globe)—Is shipping four cars weekly to El Paso smeltery; ore averaging 10% copper. High-grade ore, averaging between 25 and 30% copper, being stored; about 200 tons already on stock pile. Collar of shaft has been concreted to depth of 18 ft.; shaft retimbered 200 ft. below concrete.

Greenlee County

ARIZONA COPPER (Clifton)—Will remodel mill. Norman Carmichael, manager, at present in Edinburgh discussing and arranging details.

MAYFLOWER DISTRICT (Duncan)—Reports from Mayflower mining district that gold ore of high grade is being found. Six men are at work on property in Mayflower district 10 miles from Duncan churn drilling for copper and ore averaging 1½% has been encountered.

Mohave County

GOLD ORE (Gold Road)—Has begun sinking shaft from 350-ft. level to the 550. Property lies north of Gold Road and is receiving air from that property for operation of its drills.

VICTOR-VIRGIN (Oatman)—Orion company has taken over Victor-Virgin group and has begun unwatering. A crosscut is to be driven from the 500-ft. level of the Victor to Treasure Key.

UNITED WESTERN (Oatman)—A 60-hp. hoist and a 300-ft. compressor with proper distillate engines have been ordered. Shaft will be sunk 400 ft. before crosscutting to catch extension of United Eastern vein.

McCRACKEN (Yucca)—Old mines of McCracken Hill have been bonded to Eastern capitalists, who propose to develop entire group on large scale, commencing within 30 days. Railway is projected to Yucca or Haviland. Property has produced about $3,000,000.

Pinal County

KELVIN-SULTANA (Kelvin)—Concentrator was put in operation on May 1. Work has been resumed in the mine. Most of the ore being treated in mill now comes from stock pile accumulated during past two years and from old stopes.

MAGMA COPPER CO. (Superior)—Has almost finished campaign of building and equipment that has covered several months. Narrow-gage railroad 30 miles long has been built between town of Superior and Webster station on Southern Pacific nine miles northwest of Florence. Another shaft from 1200 level to surface almost completed, has been cut mainly by a series of raises and winzes. Shaft is two compartments, but will be widened immediately to three compartments when present raising is through to surface. New hoist will be Nordberg with capacity of 10,500 lb., hoisting speed of 750 ft. per min.; 2000 ft. capacity drums.

Yavapai County

COPPER CHIEF (Jerome)—Has been announced will build its own reduction works four miles south of Jerome. Mill will have capacity of 250 tons per day and will include stamps, tube mills and cyanide plant.

CALIFORNIA

Amador County

IONE COAL & IRON CO. (Carbondale)—Factory for manufacture of coal briquettes has been established.

ARGONAUT (Jackson)—Monthly production reported to be $60,000. Inclined shaft has reached the 4200-ft. point.

Inyo County

PITTSBURG LIBERTY (Masonic)—Old mill will be overhauled and reconstructed on modern lines.

Kern County

SAN ANTONIO (Randsburg)—Recent cleanup yielded $600 gold, $270 silver.

PHOENIX (Johannesburg)—Cleanup from Phoenix-Camperdown shaft for April netted $2050.

YELLOW ASTER (Randsburg)—Twentieth anniversary of operation of this mine was Apr. 23, in commemoration of which "Randsburg Miner" published special number.

SAN ANTONIO M. & M. (Bakersfield)—New corporation with $25,000 capital stock organized by E. L. Foster of Bakersfield and E. V. Reed and F. L. Binford of Los Angeles. Company owns claims in Red Rock district.

Kings County

KINGS QUICKSILVER MINING (Parkfield)—Reported that orebody disclosed on first level has been stoped 150 ft. long and 50 ft. wide. Ore is being treated in a Scott furnace with satisfactory returns. Concentrates and 6-ft. Huntington mill with a capacity of 100 tons in 24 hours being installed.

Mendocino County

MANGANESE DEPOSIT discovered in Potter Valley in vicinity of Ukiah. Property is owned by Leo Lambert. Reported that J. O. Hays of San José is considering disposition of options on property. Further reported that manganese has been found on Hoppe Ranch.

Modoc County

MODOC MINES (Fairport, High Grade District)—Reported that $50,000 will be devoted to equipment and that shaft will be deepened to 500 ft. Modern reduction plant designed to treat both company and custom ore will be installed. N. E. Guyot, manager.

Nevada County

POLAR STAR (Grass Valley)—New headframe being installed and mine being made ready for immediate operation. Shaft is down 300 ft. and good ledge about 4 ft. wide has been disclosed. Mine well equipped with machinery. Walter Byrne of Salt Lake is owner.

UNION HILL (Grass Valley)—Ten stamps in commission now running on low-grade ore. Connection from 800 level to intersect Union Hill vein continued. Development of Georgia vein in upper workings is also proceeding. Large output in summer months is expected.

EMPIRE (Grass Valley)—Ore is being developed on the 4600 level of the Pennsylvania vein which was recently disclosed. The new mill is giving good results. Reported that old 40-stamp mill will be replaced with modern equipment corresponding to new unit recently completed, which consists of twenty 1370-lb. stamps. Reported that the apex question between the Empire and North Star has been tentatively settled.

CLEVELAND (Grass Valley)—James Hawke, owner of placer mine in Deer Creek two miles west of Grass Valley, contemplates installation of dredge of dry land type. The gravel will be dug with clamshell bucket and dropped into sluices. The tailings of coarse gravel will be carried by conveyor belt. Steam power will be used with wood fuel.

Sierra County

JUMPER—(Downieville)—At this quartz claim an arrastra is running steadily on pay ore and second one will be added soon.

GOLD STANDARD—Active work has been commenced on this quartz property in Slate Castle Ravine, owned by J. W. Henderson and G. P. Moore of San Francisco.

SIERRA CITY (Downieville)—A strong vein over two feet wide of milling ore averaging $30 per ton has been uncovered at Keystone mine, in virgin area in lower adit.

FOREST (Downieville)—North Fork mine sulphurets have become arsenical with depth and both gold and silver have steadily increased. A 5-stamp mill is to be installed. G. F. Stone is manager.

GIBRALTER MINING (Downieville)—Corporation organized to develop rich gravel property known as Gibralter, has been granted permission by Blue Sky Commission to sell 100,000 shares of stock at 50c. per share.

COLORADO

El Paso County

U. S. REDUCTION & REFINING (Colorado Springs)—New president visiting old plants and says it is likely some will be remodeled and put in operation affording Cripple Creek district further reduction opportunities. Motion for dismissal of receiver filed at Denver.

GOLDEN CYCLE (Colorado Springs)—In sworn statement given to stock exchange, officials claim the mill to have yielded, to date, $45,000,000 in bullion; that the Pike's Peak Fuel Co., one of company's large assets, has produced 1,117,425 tons lignite; that dividends for past 12 months totaled $4,095,000; that gross bullion production for April was $709,000, this being recovered from ore having average gross value of about $23 per ton.

Gilpin County

EAST WHITING (Central City)—S. A. Ammond of Denver is cleaning out, unwatering and reopening this old mine.

WOOD (Central City)—Shaft has been sunk 100 ft. from 200 level, following continuous vein averaging 30 in. of milling ore and 5 in. of 3.40-oz. gold ore. During sinking, about 100 tons of the mill-dirt was treated in Smith mill. This is one of few pitch-blende mines of country and this recent develop-

ment was done in search of that mineral though none was found in appreciable amount.

Lake County

BIG FOUR (Leadville)—Rebuilding surface plant destroyed by fire in January. It is probable that shaft workings will be connected with Yak tunnel by driving crosscut from latter.

PENROSE (Leadville)—Pumps recently installed in shaft to unwater downtown mines soon developed defects and pumping was suspended a week to make changes and repairs.

Ouray County

WANAKAH SMELTERY (Ouray)—Will install sintering device to treat accumulated flue-dust.

Pitkin County

CONTACT TUNNEL (Aspen)—Has penetrated numerous rich streaks but no development given them as Manager F. D. Willoughby prefers to push breast to its projected object, a well-known silver-bearing contact.

San Miguel County

MOUNTAIN FLOWER (Telluride)—Delta crosscut, being driven to open Delta vein, now in more than 1000 feet.

Teller County

SITTING BULL (Victor)—Shaft down 250 ft. will be relined and sunk to 1000 ft. under contract by Ladell and Martin.

JEFFERSON (Victor)—Denver men financing reopening of this pioneer mine in business portion of city, entirely in granite formation.

TRAIL (Independence)—Strike of 4-ft. oreshoot made on 1200 level and 2 carloads shipped. Property belongs to Elkton Consolidated Gold Mining Co. although it is separate from main holdings.

DOCTOR JACK POT (Anaconda)—Starkweather and Wilson production from Ingham vein during April was about $40,000. Vein is 25 ft. thick and runs about 2 oz. per ton without sorting.

AJAX (Victor)—Lease block 13, held by Worthington and Downer, has 9 ft. of high-grade, found behind what was heretofore thought hanging wall. Shoot now exposed more than 100 ft., its average content is nearly 10 oz. per ton. It has four streaks, each of which is from 1 to 6 in. thick and rich in tellurides.

EL PASO (Cripple Creek)—Heavy shipments being made to Golden Cycle mill, Colorado City, from numerous leases in upper workings. Leases being granted to several parties to screen and wash various large dumps that were created during early operations and presumably of good grade for present-day conditions.

ISABELLA (Independence)—Three-foot body of high-grade ore opened in Buena Vista vein, 1400 level. This ore runs high in silver as well as gold. About half of vein is of vuggy structure, rich in tellurides and assaying about 15 oz. gold and 70 oz. silver. On 900 level of Lee workings, leasers have exposed 3-ft. vein averaging $200 gold per ton. There are 45 sets of leasers working in these properties and showings are favorable. Mine will hereafter work night shift to do most of the hoisting and conserve steam during day shift for compressors.

KANSAS

PORTIA (Galena)—Running double shift now and is among best producers in district. Property has lain idle for several years until S. R. Ping and associates acquired control.

HARTFORD (Galena)—Running full time now after being partly down for some weeks repairing and timbering one of shafts, which become dangerous through removing a pillar in one of drifts.

TIWAGH (Galena)—Has been idle for some time, but recently mine was drained and new shaft was sunk and dirt is being hoisted from both shafts. Mine joins Diplomat on the south which has been and is now one of the best producers in district.

TEXAS (Galena)—Has taken over United Zinc Co. property at Badger, north of Galena, and will install heavy pumps to drain ground and rebuild dikes along Spring River banks. Expects to spend about $100,000 in improvements and development work.

CAVE SPRING LEAD & ZINC (Galena)—Has about completed its dam across Short Creek just above old Grass Root mines, with purpose of diverting water and making it possible to work these mines again. Grass Root was one of most profitable mines in district for small mine, fully $50,000 worth of ore having been extracted. Expect to erect modern mill.

MICHIGAN

Copper

ESTIMATED COPPER OUTPUT of Lake Superior district for April is slightly over 21,000,000 lb. net refined metal.

MOHAWK (Mohawk)—Important plans for more extensive use of electricity in Mohawk are under consideration.

TAMARACK (Calumet)—Equipment for regrinding plant for stamp mills is on way and will be set up with all possible dispatch upon arrival.

COPPER RANGE—(Houghton)—During 1914 the average refined copper per ton of rock was 21.95 lb. compared to 21.7 average for period of 10 years.

WOLVERINE (Calumet)—Is building railway spur distance of 600 ft. to connect with Mineral Range and save great deal of teaming. Tracks now run to shafts.

LA SALLE (Calumet)—There will be resumption of operations within three weeks. Men now at work pumping out the shafts and getting things in readiness. This will require considerable time.

CALUMET & HECLA (Calumet)—Two million pounds of steel for new leaching plant at Lake Linden have been ordered for immediate shipment. Work begins July 1. Dredge at No. 2 regrinding plant of mills goes into commission within 10 days. This will be first large test of rehandling of sands out of big tailings pile in lake.

ISLE ROYALE (Houghton)—Turbine in new stamp mill is in place; at least one head in mill ready to go into commission about June 15. Turbine will be operated by exhaust steam from stamp head.

AHMEEK (Ahmeek)—Two additional shafts, North Ahmeek, will be ready to go into operation by June 1. They could hoist rock before that date if there was mill capacity ready for them. They were shut down when war started, so there is comparatively little work necessary to get them in readiness for hoisting.

QUINCY (Hancock)—Bottom drifts from Mesnard shaft, like those in other shafts, are showing better in copper. Faces of extreme north drifts from 51 level down, are in fair copper ground, more or less bunchy. Outlook is good for stamp rock to continue with depth in these lodes. Like those of other shafts, bottom stopes show slight improvement in copper contents. Copper rock sent to stamp mills from this shaft has shown higher copper content during last six months on account of its being mined freer of wall rock.

Iron

SOUTH JACKSON (Negaunee)—Cleveland-Cliffs Iron Co. has given orders for opening this pit mine. Crusher at property was started this week. About 50,000 tons will be shipped. The crusher also handles the ore from some of other soft ore mines of company on Marquette range.

BRISTOL (Crystal Falls)—Surface right to parts of Sections 24 and 25, T 43—R 33, has been purchased by this company. Part of tract is underlaid with ore. Mineral right has been held for some years. It is intention to charge course of Brial Hill Creek, as orebody follows river course for some distance. Lands are now being drilled.

CLEVELAND-CLIFFS IRON (Ishpeming)—President W. G. Mather, of Cleveland, was at the local offices this week. He stated that no large movement of ore is looked for this year. His company has over 3,000,000 tons of ore in stock on Marquette range, over 600,000 tons at Negaunee and Mass properties in Negaunee and over 500,000 at Stephenson mine at Gwinn.

MINNESOTA

Duluth

APRIL ORE SHIPMENTS from Duluth-Superior ports including Two Harbors, for April totaled 396,273 tons as against 86,886 tons in 1914.

Cuyuna Range

MAHNOMEN MINING CO. (Ironton)—Company recently incorporated by C. K. Quinn and others, Mesabi Range operators, to strip deposit owned by Cuyuna Iron & Manganese Ore Co., adjoining Pennington Pit. Contract for stripping been let to A. Guthrie & Co. Average depth of overburden 65 to 70 ft.

Mesabi Range

GRAHAM (Old Mesaba)—Tracks being laid to this property. Tracks were placed in 1912 and removed again in that year. One shovel will be put to work in pit.

BRUNT (Iron Mountain)—Shovel which has been stripping overburden is now in ore. Drying plant has been started. Ore is going forward to the docks. Fifty men are employed.

Vermilion Range

SIBLEY (Ely)—New shaft now down 133 ft. below surface. Crew at work raising from below. Shaft will be of steel, lined with concrete, 3-compartment, two skips and one cage. Upon completion of new shaft, in probably three months, old shaft will be abandoned, being located in the orebody. New shaft will be 600 ft. deep.

MONTANA

Beaverhead County

BANNACK CONSOLIDATED (Bannack)—Mill is to be constructed for treatment of some 200,000 tons ore in sight. Will be amalgamation and cyanide with initial capacity of 100 tons daily. John M. Browning, of Ogden, is president of new company.

Deer Lodge County

TREASURE STATE MINERAL—Will resume operations at its placer claims for recovery of gold and sapphires. Property which is located in Dey Cottonwood Gulch, 18 miles northwest of Butte has been idle for nearly 15 years due to litigation. For last 10 days men have been at work repairing big dredge that has been on ground for years and it is expected that it will be ready for operations within a few months. Has capacity of 2000 cu.yd. per day. The gold said to average from 17c. to as high as $1.60 per cubic yard. Sapphires also are of good quality and size.

Silver Bow County

EAST BUTTE (Butte)—Has resumed full capacity operations and will sink shaft now 1770 ft. deep to the 2000-ft. level.

DAVIS DALY (Butte)—During quarter ended Mar. 31, shipped 1135 tons of ore averaging 3.7% copper and 7.2 oz. silver. Picked up new vein on 2500 level containing some commercial ore but ultimate value not determined.

ANACONDA (Butte)—Output from all operating mines of company for April was 21,800,000 lb. of copper, an increase of 2,800,000 lb. over March. Judging from present indications May production will show gain over previous months and will bring the company's output up to normal.

BUTTE & SUPERIOR (Butte)—Payroll for April will total more than $155,000, largest in history of company. Output was in excess of March record which up to that time was also largest in history of company. April output was 43,500 tons of ore, with concentrates realized to the amount of 13,100 tons.

NORTH BUTTE (Butte)—During quarter ended Mar. 31 there were mined, shipped, and treated 55,683 wet tons of ore and 24 tons of precipitates resulting in the production of 3,358,325 lb. of copper, 179,568 oz. of silver and 180.6 oz. of gold. Report says that policy of extensive development work will be continued.

BUTTE-BALLAKLAVA (Butte)—Active operations were resumed May 1. Since February has only been operating

through leasers in small way; 50 men were put to work taking out ore on all levels between the 800 and 1600 ft.; number will be increased steadily until about 125 men are employed. Output of mine will be about 150 tons per day, and this will be increased as additional men are put to work to reach approximately 350 tons. The ore is being sent to Washoe smeltery. It averages between 4½ and 5% copper.

Teton County

AMALGAMATED OIL COMPANY—Several well known Butte men have recently organized this company for purpose of drilling for oil in Sweetgrass Valley oil belt in northern Montana where company has number of leases. Company not entirely dependent on Montana, having secured similar leases in coast oil belt in Texas.

NEVADA

Clark County

AZALEA (Goodsprings)—Vein of high-grade zinc carbonate recently opened. Truck road has been constructed. Ore will be hauled to Jean by motor truck. Walden Kemp is Superintendent.

AKRON (Goodsprings)—High-grade silver ore recently discovered. Assays from 40- to 600-oz. silver per ton were obtained from cropping which also contains carbonates of lead and zinc. A shaft has been started on discovery.

POTOSI (Arden)—Eight motor trucks now being used for ore haulage from mine to Arden. Production approximately 800 tons of zinc carbonate. Calcining plant recently erected has proved successful, and has been recently overhauled and enlarged. Expected that this method of treatment will be used at some other properties in Yellow Pine district.

WHALE (Goodsprings)—This property has recently been bonded by the Nevada Whale Mining Co., composed of Salt Lake capitalists headed by W. P. O'Meara. A 10-ft. vein of zinc-carbonate ore has been opened by a tunnel and shaft. A small compressor has been installed and air drills will be used for further development. Thomas Varden is superintendent.

Elko County

GUARANTEE MINING & DEVELOPMENT (Elko)—Articles of incorporation filed, capitalization $2,500,000. Principal place of business, Farrington Building, Elko, Nevada.

RIP VAN WINKLE (Elko)—Lease let on this property 30 miles north of Elko and work will begin at once. This property sold recently to Alaska Improvement Co. for $25,000. Ore, silver-lead of good grade.

Esmeralda County

SANDSTORM-KENDALL (Goldfield)—Crosscutting on 350 level started. Drifting on 500 level continuing in ore.

COMBINATION FRACTION (Goldfield)—Good-grade gold ore opened recently on 250 level near Florence end line. Work being done by leasers.

JUMBO EXTENSION (Goldfield)—Ore from development work being shipped to local sampler. Development work under way in seven places. Stated ore reserves doubled in last three months.

SILVER PICK CONSOLIDATED (Goldfield)—Cutting station on 700 level begun. Ground at this point hard latite, eliminating trouble with swelling ground. Water increasing with depth, but pumping plant of sufficient capacity to handle it.

BOOTH (Goldfield)—Development work being done on 350 and 500 levels. Small tonnage good-grade ore developed. Connection made on 500 level with Laguna workings of Goldfield Consolidated for ventilation; raises now being lifted from this drift in vein showing seams of high-grade ore.

GREAT BEND (Goldfield)—Mining operations resumed by company; work for past two years done by leasers only. Leasing company on eastern part of property built mill some time ago and operated at good profit, making shipments of high-grade ore in addition. This lease taken over by company, development work resumed, and mill will be enlarged. Compressor, five piston drills and No. 8 Cameron pump ordered.

Humboldt County

ODDIE LEASE (Willard)—Ore shoot 2 ft. wide, assaying $62 in gold, opened in trenching; sinking now under way.

LEONARD CREEK PLACERS will be in operation soon. Good-grade placer ground on both Leonard and Tepee creeks.

NEW MILL AT ROCHESTER will be built soon by McIntosh-Pitt, Original Rochester Mines, Crown Point Extension, and Rochester Belmont properties.

FINLANDER (Willard)—Option taken recently by J. W. Willard. Property consists of two claims adjoining Honey Bee, original strike of district. Vein exposed for length of 1200 feet.

ROCHESTER BELMONT (Rochester)—Leases all expired and work resumed by company. Crosscut tunnel will be driven to cut vein at depth of 600 ft. on Little Sunflower No. 2 claim.

TAYLOR (Winnemucca)—Shipment of carload gold-silver ore assaying $80 per ton made from this property in Sunshine district, 30 miles from Winnemucca. Considerable tonnage milling-grade ore placed on dumps for future treatment.

ROCHESTER MINES (Rochester)—New mill with estimated capacity of 100 tons is treating 120 tons daily and will treat 150 tons in short time. Extraction now 89%; expected this will be improved. Work on new 1400 crosscut tunnel started.

Lander County

SURVEYS BEING MADE of copper properties under bond to W. P. Hammond interests. Development work will start soon.

COPPER SYNDICATE (Battle Mountain)—Company will prospect claims in Copper Basin with churn drill; Keystone drill, 1200 ft. capacity, purchased from Glasgow & Western.

KIMBERLY CONSOLIDATED (Hilltop)—Milling plant began operations recently; plant running full capacity. Good-grade gold ore being treated.

CAMERON & HART (Austin)—This leasing firm has moved its cyanide plant to tailing dump at foot of grade and is now ready for operations. Tailing will be dug by scrapers and will be hauled on bridge-work over tanks. Dump contains 3000 tons assaying 7 oz. silver and 60c. gold.

AUSTIN-NEVADA (Austin)—Hiawatha tunnel cut 4-ft. oreshoot at 150 ft. from portal; drifting west in milling-grade ore now under way. Tunnel will be driven further to cut three other veins showing silver chloride and sulphides on surface. Main tunnel now in 600 ft.; oreshoot 60 ft. long showing ruby silver opened.

Lincoln County

PROVIDENCE MINES & COMMERCIAL CO. (Pioche)—Petition in bankruptcy set for hearing in Federal Court at Carson City.

PRINCE CONSOLIDATED (Pioche)—Shipments of manganese ore being maintained at an average rate in excess of 10,000 tons per month. About 100 men on pay-roll.

PIOCHE AMALGAMATED (Pioche)—Short crosscut into foot-wall on 1200 level opened new vein, 2 to 6 ft. wide. Leases let on slag dumps of Pioche Consolidated and Bristol Wells.

AMALGAMATED PIOCHE (Pioche)—Force at work has been somewhat curtailed during the past week owing to the refusal of the smelters to accept zinc shipments. About 80 men still on the pay-roll.

Lyon County

PRESCOTT MINING (Ludwig)—Operating North Douglas property; tunnel now in 600 ft., being driven.

SUTRO TUNNEL CO. (Sutro)—Transfer of 1250 acres land made to Celestino Carrara recently; consideration, $30,000.

DONOVAN MILL (Silver City)—Addition of five stamps with electric motor drive made, making total of 15 stamps.

EMPIRE-NEVADA (Yerington)—Leasers Oberg & Taylor are shipping good-grade coper ore. Leasers in Vardy shaft are also breaking shipping-grade ore.

HOTALLING MILL (Dayton)—Operations will start soon; ore from Hayward mine, Silver City, will be treated. Two shifts working at mine. Pumps will be installed in shaft.

NEVADA-DOUGLAS (Ludwig)—Satisfactory progress being made on construction of new leaching plant. Concrete foundations all finished and work on superstructures under way. Digester installed, absorption towers nearly completed and condenser enclosed and ready for pipe connections. Bluestone mine, Mason, is being examined.

Mineral County

OLD KENTUCKY (Sweetwater)—Mine bonded by Eastern men and work started May 1. Mine a famous producer in early days.

LUCKY BOY CONSOLIDATED (Hawthorne)—Main tunnel now in 5800 ft., driving west will be continued. Raise being lifted to connect with Hubbard shaft. Fifty-foot crosscut driven to King vein; five oreshoots opened. Leaser on Oregon claim opened shoot showing free gold.

Nye County

TONOPAH ORE PRODUCTION for week ended May 1 was 10,665 tons, estimated at $217,930, compared to 10,109 tons the week previous. The producers were: Tonopah Belmont, 3648; Tonopah Mining, 3000; Tonopah Extension, 1680; West End, 825; Jim Butler, 1100; Tonopah Merger, 154; North Star, 50; and Halifax 208 tons.

TONOPAH CASH BOY (Tonopah)—Lowering water in Victor shaft will drain Cash Boy, permitting work at greater depth.

MIDWAY (Tonopah)—Seven leases let in ground opened by old shaft between 200 and 500 levels; more will be let. Company operating ground opened by new shaft.

NORTH STAR (Tonopah)—Drifting on 2-ft. oreshoot of good grade, assaying almost entirely in gold, under way on 1250 level. New crosscut started to cut western extension of vein.

LLEWELLYN PLACER (Round Mountain)—Two monitors working; water supply secured from Jefferson, Slaughterhouse and Shoshone cañons. Record nugget for this ground, valued at $240, found last season.

Storey County

UTAH (Virginia City)—Hoisting plant being demolished. This one of principal hoisting plants on Comstock Lode in early days.

MEXICAN (Virginia City)—Good-grade ore being broken in north stope on 2300 level. Winze station in Patton crosscut on 2500 level being repaired preparatory to work on deeper levels, soon to be made accessible by work of Comstock Pumping Association. Similar preparatory work under way in Ophir, Consolidated Virginia and Union Consolidated.

OPHIR (Virginia City)—Work in Central tunnel continues to open good tonnage low-grade ore. Ventilation greatly improved by repairs to raise on Andes line. Stoping on East ledge under way. Mill shut down three days recently for repairs. Work on 2500 level under way jointly with Consolidated Virginia. Winze to 2700-ft. level will be repaired preliminary to work on that level.

White Pine County

COCOMONGO MINING (Cocomongo)—Ten-stamp mill overhauled and operations resumed on custom ore supplied by leasers in district. Camp is six miles southwest of Cherry Creek.

NEVADA CONSOLIDATED (Ely)—Production now normal. Steam shovels operating on hill between Eureka and Liberty pits with purpose of joining them; pit will then be quarter mile wide. Preparations for underground mining in Ruth mine under way.

ELY AMALGAMATED (Ely)—This property in Duck Creek mining district will build concentrating plant soon. Arrangements made with Nevada Consolidated for water supply. Large tonnage good-grade concentrating ore developed in mine. Stated Ely Gibraltar may also build mill.

OREGON

Baker County

GOLDEN GATE MINE—The 10-stamp mill at this mine has been started after having been closed for several weeks.

J. F. ELSTEP, representing a California syndicate which has secured options on the Emil Melzer holdings on Clark's Creek, has started drilling operations with view of erecting dredger.

POWDER RIVER GOLD DREDGING (Sumpter)—Work of clearing brush getting ready for digging pit for new dredge is under way. The dredge will be a duplicate of the one now in operation by this company near Sumpter, except it will have 7-ft. instead of 9-ft. buckets as on dredge now in use.

Coos County

TWO TONS OF GOLD-BEARING BLACK SANDS have been taken from the South Inlet district near Marshfield, by J. C. Moulton, representing San Francisco company. Samples were taken from prospects recently opened up by John R. Smith. Company will drill district thoroughly with view to mining same for gold and platinum. These deposits are an old beach and gold-bearing sands are covered with few feet of earth and rubbish.

Curry County

MANY PLACER CLAIMS are being staked in vicinity of Rock Creek which is back from Ocean Beach at Port Orford. Considerable amount of nuggets has been found.

Josephine County

OSCAR CREEK PLACER—Bernard P. Miller has taken a lease on this property on the Applegate River which has been a good producer of large show nuggets.

KERBY QUEEN MINE (Waldo)—Ore from this mine being transported 40 miles by wagon to railroad at Grants Pass for shipment to smeltery at Kennett, Calif.

GREENBACK MINE—Miller and Gale, who have recently optioned this property are now making test run at mill, ten stamps being in use. This mine has yielded well to previous owners but has been idle for two years.

COPPER QUEEN (Leland)—Plant has recently been rearranged and new equipment added by P. B. Wickham who recently purchased property. Operations at cyanide plant have commenced; plant has capacity of 20 tons per day and will be increased to 40 tons per day within next month.

UNITED COPPER & GOLD—Copper properties of this company sold to Charles O. Wheeler and associates of Scranton, Penna., for $250,000 to be paid in installments during the next three years. Mine is 33 miles west of Grants Pass on Illinois River. Operations at the mine are to begin in June.

Lincoln County

B. F. JONES (Roseburg)—Formally receiver of Land Office has purchased Sweet Bros. concentrator and will go into black-sand mining on beach at Otter Rock post office.

UTAH

Beaver County

PALOMA (Milford)—Two feet of zinc ore of good grade found in old shaft on this property in Star district.

ROB ROY (Beaver City)—Work has been resumed at this property five miles north of the Sheep Rock. B. T. Farnsworth of Salt Lake is interested.

LEONORA (Milford)—Lying between Moscow and Cedar Talisman, will install compressor and hoist. Crosscutting will be started from drift off main shaft, for Thompson fissure. There are three other fissures which will be prospected at contact of limestone with monzonite intrusion.

Juab County

TINTIC ORE SHIPMENTS for week ended Apr. 30 amounted to 132 cars compared with 116 cars week previous.

GODIVA (Tintic)—Has opened up 4½ to 5 ft. of ore in raise from 200 level assaying 35% zinc with but little lead.

MAMMOTH (Tintic)—Resumed shipments with six carloads ore from 600 level after a nonproductive period of four months.

Salt Lake County

UTAH METAL & TUNNEL (Bingham)—This company has opened body of silver-lead ore in raise above main tunnel. Material runs well in lead and silver and carries copper and gold.

UTAH COPPER (Bingham)—Arthur and Magna mill now working at full capacity, treating daily from 18,000 to 20,000 tons of ore. Additional flotation equipment to treat feed from the secondary classifiers is being considered.

Summit County

PARK CITY ORE SHIPMENTS for week ended May 1 amounted to 1987 tons compared with 1960 tons week previous.

Tooele County

INTERNATIONAL SMELTERY (Tooele)—Is running five furnaces on lead ores and three reverberatories on copper. Approximately 1000 tons of lead ore and 600 to 700 tons of copper ore are being treated daily.

MINES IN DRY CAÑON section of Ophir district are shipping about 1000 tons per month. Those producing are: Hidden Treasure, Mono, Stephens, Brooklyn, and Utah Queen; also numerous leasers. Post office for this section is Gisborn, Utah.

DRY CAÑON CONSOLIDATED (Stockton)—Is driving tunnel for purpose of picking up continuation of Queen of the Hills oreshoot, lost through faulting. Tunnel is in 4000 ft., and for the last 200 ft. has passed through highly mineralized ground. Queen of the Hills ore ran well in lead and silver.

WASHINGTON

Stevens County

NORMAN LEAD (Northport)—Owing to inability to agree upon development plan with owners, has concluded not to proceed with installation of new machinery at present time.

UNITED COPPER (Chewelah)—Will increase working force from 75 to 100 men. Output will gain accordingly, in preparation for operation of 50 stamps now being added to the milling capacity. Conrad Wolfle, of Spokane, is manager.

AMERICAN REDUCTION (Spokane)—New organization, with $250,000 capital, by F. R. Clark, mining engineer, has acquired North Washington Power & Reduction Co., at Republic. Consists of concentrator, power plant, and mining equipment. Will begin active operations.

WISCONSIN

Grant County

WISCONSIN ZINC (Platteville)—Company is prospecting on old Broadway leases in the City of Platteville.

Iowa County

ROSS (Linden)—This old producer will add another milling plant.

LUCKY SIX (Mifflin)—Company is erecting 200-ton mill at Dodger mine.

Lafayette County

STATE LINE (New Diggings)—Company has made valuable discovery of zinc ore by churn drilling at New Diggings.

CANADA

Ontario

CANADIAN MINING & EXPLORATION CO. has underwritten 20,000 shares of new issue of Alaska Juneau.

DOME MINE (Porcupine)—Coming annual meeting is expected to make decision relative to building larger mill.

VIPOND (Porcupine)—Is diamond drilling on 300 level. Capacity of mill is to be increased to 120 tons per day.

ST. PAUL CLAIMS (Bartlett Township)—Shaft is being sunk on this property situated some distance south of Porcupine.

McINTYPRE (Porcupine)—Contact vein has been cut on 400 level from No. 5 workings. It is similar in width and grade to 500 level vein.

RIGHT-OF-WAY (Cobalt)—Now that power is available it is intention of company to start active exploration from No. 3 shaft on south end of property.

NORTH THOMPSON (Porcupine)—One of Hamilton, Erlich & Co. subsidiaries, has resumed operations and contract has been given for sinking of a 300-ft. shaft.

TEMISKAMING AND BEAVER MINES (Cobalt)—The manager, Moffat, and president, Culver, are getting bids on big power plant to be used by both properties.

CASEY COBALT (Cobalt)—Development on 365 level from new shaft, has opened up three new veins from 1 in. to 2 in. of high-grade ore in an entirely new part of property.

MINING CORPORATION OF CANADA—(Cobalt)—Started new cyanide annex Apr. 26. Will treat 170 tons of slime products from Townsite, City of Cobalt and Cobalt Lake mines.

BEAVER (Cobalt)—Estimated that there are 45,000 tons of ore on dump and broken in the mine which will produce 1,200,000 oz. of silver and that this ore can be raised from mine and milled for $100,000.

PORCUPINE PET (Porcupine)—Company has made voluntary assignment to creditors. A 5-stamp mill has been in operation for about a year but ore was spotty and development was very costly.

CASEY MOUNTAIN (Cobalt)—On this property adjoining Casey Cobalt operations have been begun by R. G. Williamson, of Calgary. Diamond drilling will be undertaken immediately and machinery installed.

YORK ONTARIO (Cobalt)—Work will at once be recommenced at King Edward mine on which this company holds lease. A contract has been let for sinking of shaft from its present depth of 500 ft. to 1000-ft. level.

TIMISCAMING & HUDSON BAY (Cobalt)—This company has secured option on Wright claims known as Salvador property. Little of value has so far been found on this location, but developments on adjoining properties have been encouraging.

NIPISSING (Cobalt)—Thomas Syskoe, a German-Pole, tried for attempting to blow up powder magazine of Nipissing company, found guilty. Maximum penalty of fourteen years' imprisonment was imposed. John Syskoe and Walter Henshall charged with conspiracy were acquitted.

DOME LAKE (Porcupine)—Has been closed down for short time to enable necessary repairs to be made in mill. Crew has been discharged but will be hired back again at lower wages to conform to average wage scale of camp. This done to escape provisions of Lemieux Act which requires 30-day notice before wages can be cut. It is expected that under new arrangement property can make profit of $4000 a month. At this rate will take two years to repay Hudson Bay the money loaned.

HOLLINGER (Timmins)—Regular four-weekly statement for period ended Mar. 25 is less favorable than usual on account of curtailment owing to power shortage. Gross profits were $151,004 from 22,066 tons of ore, average value $11.53 per ton. Working costs $4.09 per ton. On distribution of dividend on Apr. 22, $3,000,000 has been paid in dividends or $60,000 more than paid up capital.

BURMA

BAWDWIN MINES—Cable advices report continuation of 430 level crosscut shows an additional 17 ft. of silver-lead ore, average assay 50 oz. silver, 52% lead and 13% zinc, in addition to the 40 ft. previously reported, averaging 24 oz. silver, 23% lead and 37% zinc. This 17-ft. band of high-grade silver-lead ore was 5 ft. wide in cross-cut 130 ft. above. Similar band was disclosed on 300 level in crosscut from winze 365 ft. north of internal shaft.

The Market Report

METAL MARKETS

NEW YORK—May 12

Copper was rather dull during the last week, and lead showed signs of being not quite so strong as it was. On the other hand, the spelter market went higher than ever, advancing on relatively small business.

Inasmuch as transactions in spelter are based solely on St. Louis, except at those rare intervals when foreign spelter is imported into this country, when New York becomes the basing market, we have discontinued the column of New York prices. Anybody who needs to know the New York equivalent place, for averages or other purposes, may add 17c. per 100 lb. to the St. Louis price.

Copper, Tin, Lead and Zinc

Copper—Business in copper during the last week was relatively light and the market was characterized as flat. The largest sellers maintained their previous asking price of 18⅞@19c., regular terms, but no business at that price was reported except for non-competitive markets. Such business as offered itself was taken by other sellers who were willing to accept 18¾c., regular terms and did so, the transactions amounting to fairly large volume in the aggregate. At the close of the week there were still sellers at 18¾c., regular terms.

The sinking of the "Lusitania" apparently created no alarm respecting the shipping situation.

The port of Archangel is now reported to be open and one ship is said to have entered there.

Some extraordinarily large orders for copper were under negotiation during the last week, but up to the time of our going to press had not been concluded. Questions of capacity enter largely into the considerations. Some of these pending contracts provide for deliveries as far ahead as 1917. This does not mean necessarily that it is regarded that the war will last so long, but simply that in arranging for copper supplies it is deemed best to contract for the maximum that may be required, it being certain that the copper will be wanted after the war anyhow.

Exports of copper for the week ended May 1 are reported by the Department of Commerce at 15,351,637 lb.; also 4400 tons of matte valued at $6390. The chief metal exports were 8,029,030 lb. Great Britain; 3,472,633 lb. to Sweden; 2,042,432 lb. to Canada; 896,715 lb. to Italy; 700,460 lb. to France. Imports for the week were: Metal, 3,436,164 lb.; in ore and matte, 1,519,084 lb.; total, 4,955,248 lb. The larger imports were from Canada, Chile, Peru, Spain and Japan.

Copper Sheets base price is now 24c. per lb. for hot rolled and 25c. for cold rolled. Usual extras charged and higher prices for small quantities. Copper wire is 19½@20c. per lb. carload lots at mill.

Brass Prices, base, to date from Apr. 28 are: Sheets, 21¾c. net per lb. for high brass; 22⅞c. for low brass. Wire, high brass, 21½c.; low brass, 22⅞c. Rods, high brass, 21½c.; low brass, 23⅝c. Tubes, 25⅜c. for both brazed and open seam. Angles and channels, 25⅜c. Scrap allowances are 16¼c. net per lb. for high brass; 16⅞c. for low brass.

Tin—The sinking of the "Lusitania" created some excitement in this market, and a rather heavy business was done on May 8 at an advance in price, but otherwise, the market was quiet during the week.

A company has been formed at **Santiago,** Chile, to build a plant to smelt tin ores from Bolivia. It is proposed to build the plant at Arica or Mejillones.

Imports of Tin from Great Britain, as already announced, are now permitted only on invoices to the British Consul-General at New York. Deliveries to the purchasers here have to be made on application to the consulate specifying packages, quantities, etc., and giving the following guarantee: "In consideration of your consenting to the delivery to them of the said tin, chloride of tin, tin ore (a), I undertake that I will not, directly or indirectly, at any time so long as the present war continues, export any tin, chloride of tin, or tin ore from the United States, except to the British Dominions, and that I will not sell any tin, chloride of tin, or tin ore for exportation without satisfying myself that it is not intended for exportation from the United States, except to the British Dominions."

This must be accompanied by guarantees from the purchaser that the tin is intended for industrial use in the United States and that he will not export it or sell it to others to be exported to any country except the British Dominions. A similar undertaking must be given whether the importer takes the tin for his own use or for sale to a second party, the respective forms differing only in slight detail.

Lead—Inquiries for military purposes are again exciting some interest, but the supply of lead appears to be ample, and in the latter part of the week the market exhibited a rather softer tone.

Spelter—At the close of our last previous week of record, this market was distinctly softer in tone, but during the last week there was an advance again on moderate business—a few thousand tons—and the situation appears to be tied up tighter than ever. The sales of last week were chiefly for

DAILY PRICES OF METALS IN NEW YORK

May	Sterling Exchange	Silver, Cts. per Oz.	Copper	Tin	Lead		Zinc
			Electrolytic, Cts. per Lb.	Spot, Cts. per Lb.	New York, Cts. per Lb.	St. Louis, Cts. per Lb.	St. Louis, Cts. per Lb.
6	4.7956	50	18.50 @18.60	39	4.20 @4.30	4.12½ @4.17½	11½ @13½
7	4.7956	50	18.50 @18.60	39	4.20 @4.30	4.12½ @4.17½	12 @13½
8	4.8000	50	18.50 @18.60	41	4.20 @4.30	4.12½ @4.17½	12 @13½
10	4.7975	50⅛	18.50 @18.60	41	4.20 @4.25	4.12½ @4.15	12½ @13½
11	4.7913	50⅛	18.50 @18.60	40	4.20 @4.25	4.12½ @4.15	12½ @13½
12	4.7956	50⅛	18.50 @18.60	40	4.20 @4.25	4.12½ @4.15	12½ @13½

The quotations herein are our appraisal of the average markets for copper, lead, spelter and tin based on wholesale contracts for the ordinary deliveries of the trade as made by producers and agencies; and represent, to the best of our judgment, the prevailing values of the metals, reduced to basis of New York, cash, except where St. Louis is given as the basing point. St. Louis and New York are normally quoted 0.17c. apart.

The quotations for electrolytic copper are for cakes, ingots and wirebars. Electrolytic copper is commonly sold at prices including delivery to the consumers and is subject to discounts, etc. The price quoted for copper on "regular terms" is the gross price including freight to the buyer's works and is subject to a discount for cash. The difference between the price delivered and the New York cash equivalent is at present about 0.20c. on domestic business. The price of electrolytic cathodes is 0.05 to 0.10c. below that of electrolytic. Quotations for lead represent wholesale transactions in the open market for good ordinary brands. Quotations for spelter are for ordinary Prime Western brands. Only the St. Louis price is herein quoted, St. Louis being the basing market. We quote the New York price at 17c. per 100 lb. above the St. Louis price.

Silver quotations are in cents per troy ounce of fine silver.

Some current freight rates on metals per 100 lb. are; St. Louis-New York, 17c.; St. Louis-Chicago, 6.3c.; St. Louis-Pittsburgh, 13.1c.

LONDON

May	Silver	Copper				Tin		Lead		Zinc	
		Spot		3 Mos.	Best Sel'td	Spot	3 Mos.				
		£ per Ton	Cts. per Lb.					£ per Ton	Cts. per Lb.	£ per Ton	Cts per Lb.
6	23 9/16	78¼	17.00	79¼	....	161½	162	20½ @20¾	4.37 @4.51	64½	14.01
7	23½	79½	17.27	80¾	....	164½	164	20½ @20¾	4.37 @4.51	64	13.90
8	23 9/16	....	....	....	....	....	....	....	....	....	....
10	23⅝	79½	17.27	80¾	....	165½	165	20 @20⅛	4.35 @4.48	62	13.47
11	23⅝	77⅝	16.86	78⅝	....	164	164	19⅞ @20⅛	4.32 @4.45	62	13.47
12	23⅝	80	17.38	80¾	....	164	164	19⅞ @20⅛	4.32 @4.45	64½	14.01

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb., except silver which is in pence per troy ounce of sterling silver, 0.925 fine. Copper quotations are for standard copper, spot and three months, and for best selected, price for the latter being subject to 3 per cent. discount. For convenience in comparison of London prices, in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given, reckoning exchange at 4.80. £15 = 3.21c.; £20 = 4.29c.; £30 = 6.43c.; £40 = 8.57c.; £60 = 12.85c. Variations, £1 = 0.21½c.

domestic account. Apparently some large consumers were short of covering their requirements for May and June spelter and were obliged to deal with sellers who could supply liberally for those months but included in their terms the taking of considerable quantities of spelter for later deliveries. Sellers who could supply only the later deliveries were out of competition for this business, and found it difficult to sell on any terms satisfactory to themselves.

On May 10 tenders for delivery of 400 tons of intermediate spelter to the Washington Navy Yard were opened. The business was taken at 17.24c. delivered there.

Zinc sheets have been a little lower and the base price is now $16.50 per 100 lb. f.o.b. La Salle, Ill., less 8% discount. Usual extras charged. The makers are not anxious to sell just at present.

The first cargo, 6000 tons, of Broken Hill ore is now being delivered at Bartlesville, Okla. The steamer came hrough the Panama Canal and discharged at Galveston, where she took aboard a cargo for Liverpool, whence she will go back to Australia.

Our Kansas correspondent reports the following furnaces now in operation in Kansas and Oklahoma, not including the two small plants at Pittsburg, Kan.

Works	Number of Furnaces	Daily Output tons
Granby	6	50
Altoona	5	31
Kirk, Iola	1	4½
Prime Western, Iola	4½	23½
Prime Western, Gas	4½	23½
American, Dearing	5	39
American Caney	4	42
Bartlesville, Collinsville	12	92½
Bartlesville, Bartlesville	9	54
Tulsa	9	54
Sand Springs	3	20½
National	7	49
Lanyon-Starr	5	30½
Cherryvale	8	67
Totals	83	581

The present production is at the rate of 210,000 tons per annum. The output of Kansas and Oklahoma in 1914 was 139,343 tons. A new furnace is being built at Sand Springs. There are no stocks of spelter at the Kansas-Oklahoma works. In their bins there were about 53,000 tons of Western ore and 5000 tons of Joplin ore on May 1. This group of smelters uses relatively little of the Joplin production of ore, the bulk of which goes to smelters in Illinois.

Other Metals

NEW YORK—May 12

Aluminum is more active and demand seems to be increasing. Prices are rather firmer, 19½@19¾c. per lb. being quoted for No. 1 ingots, New York.—**Antimony** is strong and rather excited, and purchasers find it difficult to get supplies. Ordinary brands are 35@37c. per lb. Cookson's is entirely nominal, but 42@43c. per lb. has been paid. No bids for futures are accepted.—**Nickel** is steady and unchanged. Ordinary forms are 40@45c. per lb., according to size and terms of order. Electrolytic, 3c. per lb. higher.—**Quicksilver** is still uncertain but rather quieter than it has been. In New York large lots are held at $74 per flask of 75 lb., but there are reports that sales have been made lower. Small lots are quoted at $75@80 per flask. London price is £11 15s., with second hands quoting £11 12s. 6d. per flask.

Minor Metals—Current sales of **Bismuth** have been at $2.75 @3 per lb., New York.—**Selenium**—Quotations are $2@3 per lb. for larger quantities; $4.50@5 per lb. for smaller lots.—Cadmium is quoted in London at 6s.—$1.44—per lb.—**Tellurium** is reported sold at 80s.—$19.20—per lb. in London.

Gold, Silver and Platinum

NEW YORK—May 12

Gold in the United States May 1 is estimated by the Treasury Department as follows: Held in Treasury against gold certificates outstanding, $1,060,343,169; in Treasury current balances, $224,755,256; in banks and circulation, $604,044,040; total, $1,889,142,465. This is an increase of $12,815,926 during April.

Silver—The market has been steady, but with small fluctuations. Recent purchases have been chiefly by the Indian Bazaars, which have awaited the action of the English Government on the wheat-export situation. This action the Bazaars considered favorable for silver, hence the purchases.

Coined Silver in the United States May 1 is estimated by the Treasury Department as follows: Standard dollars, $568,172,478; subsidiary coins, $185,067,966; total, $753,340,444, a decrease of $90,043 during April. Of the dollars $493,305,000 are held in the Treasury against silver certificates outstanding.

Silver shipments from London to the East Jan. 1 to Apr. 22, as reported by Messrs. Pixley & Abell:

	1914	1915	Changes
India	£2,306,500	£1,684,000	D. £622,500
China	40,000	.....	D. 40,000
Total	£2,346,500	£1,684,000	D. £662,500

Imports of silver into Great Britain, three months ended Mar. 31, were valued at £2,804,204; exports, £2,279,203; excess of imports, £525,001, which compares with an excess of exports of £1,009,023 last year.

Silver imports into Great Britain for the three months ended Mar. 31 are reported by Messrs. Samuel Montague & Co. as below, in ounces:

From	1914	1915	Changes
United States	16,665,449	21,259,555	I. 4,594,106
Canada	4,449,947	4,133,619	D. 316,328
Other countries	1,333,650	711,990	D. 621,660
Total	22,449,046	26,105,164	I. 3,656,118

The increase in imports from the United States was 1,376,564 oz. in January and 3,242,418 oz. in February; but there was a decrease of 44,876 oz. in March.

Platinum—The market remains quiet, with only a small business reported. Prices are still quoted at $38@39 per oz. for refined platinum while hard metal is $42@46 per oz., according to percentage of iridium.

Zinc and Lead Ore Markets

PLATTEVILLE, WIS.—May 8

The competitive base price paid this week for 60% zinc ore was $60@64 per ton. The base price paid this week for 80% lead ore was $51 per ton.

SHIPMENTS WEEK ENDED MAY 8

	Zinc Ore, Lb.	Lead Ore, Lb.	Sulphur Ore, Lb.
Week	3,496,480	526,800	340,260
Year	65,665,630	2,255,990	7,464,790

Shipped during week to separating plants, 3,257,000 lb. zinc ore.

JOPLIN, MO.—May 8

Blende, high price $78; assay base 60% zinc, premium ore $75; medium grades $73@65; lower grades down to $58 per ton. Calamine, base 40% zinc, $45@42 per ton; average, all grades of zinc, $63.22 per ton. Lead, high price $54.50, base $51@52 per ton of 80% metal content; average, all grades of lead, $50.34 per ton.

SHIPMENTS WEEK ENDED MAY 8

	Blende	Calamine	Lead	Values
Totals this week	13,861,800	1,933,720	1,880,550	$546,660
Totals this year	199,457,040	18,314,110	29,882,020	7,104,310

Blende value, the week, $469,180; 19 weeks, $6,058,020.

Calamine value, the week, $30,150; 19 weeks, $329,900.

Lead value, the week, $47,330; 19 weeks, $716,390.

Another record shipment is made and these are cutting down the reserve stock to a minimum, lower than since early in the year. The Collinsville, Ill., zinc smeltery has been taken over by the Picher Lead Co., of Joplin. The North Pittsburg smeltery was taken over principally by the owners of the Oronogo Circle mine and the S. Y. Ramage mine of Webb City. Ore is being shipped from the Ramage mine and some calamine is being purchased.

Iron Trade Review

NEW YORK—May 12

The iron trade has been supported this week mainly by foreign orders. The domestic business has not been large, though it promises better for the future.

Structural steel is looking up and there is much more business in sight. Some large car orders are under negotiation and the railroads have taken a lot of bridge material. The mill continue to operate at 70 to 75% of capacity, and seem confident of being able to maintain that rate.

The pig-iron market has been more active and sales have been quite large. Some speculative buying is again apparent, especially in Southern iron.

The Chesapeake & Ohio and the Southern R.R. have reduced rates on pig iron from Virginia furnaces to Norfolk or Newport News from $1.52½ to $1 per ton when the iron is for export. The Norfolk & Western has made a similar reduction.

Imports at Baltimore for the week included 970 tons ferromanganese from Liverpool, England.

Pig Iron Production in April again showed an increase. The reports of the furnaces, as collected and published by the "Iron Age," show that on May 1 there were 195 coke and anthracite stacks in blast, having a total daily capacity of 71,400 tons; an increase of 1400 tons over Apr. 1. Making allowance for the charcoal furnaces the total production of pig iron in the United States in April was 2,143,500 long tons; for the four months ended Apr. 30 it was 7,560,400 tons. Of this total 5,488,500 tons, or 71.2%, were made by the furnaces owned or operated by the steel companies.

Exports and Imports of Iron and Steel, and of manufactures thereof, two months ended Feb. 28, are valued as below by the Department of Commerce:

	1914	1915	Changes
Exports	$33,226,658	$34,524,172	I. $1,297,514
Imports	4,532,582	3,080,115	D. 1,452,467
Excess, exports	$28,694,076	$31,444,057	I. $2,749,981

The larger increases in exports this year were in bars, billets and wire.

PITTSBURGH—May 11

While all business men are deeply moved by the "Lusitania" event, trade is not likely to be affected seriously if at all. Consumption is not decreased thereby. The horrors of war as they are seen are increased but the recent trade revival occurrd in full viw of the war and while expectations were entertained that it would last years rather than months.

The Steel Corporation showed a decrease of 93,505 tons in unfilled obligations during April, to a total of 4,162,244 tons at the close of the month. The decrease was 4000 tons greater than that of March but shipments probably increased 50,000 tons or so, indicating that bookings were somewhat heavier in April than in March. The bookings would have been larger if the mills had been willing to accept contracts more freely for forward delivery.

To the large car inquiries of the Pennsylvania R.R. system already reported there have been added inquiries, chiefly from western roads, for fully 15,000 cars, perhaps 20,000, making a total of 30,000 to 35,000 freight cars now in the market, not far from double the number actually purchased since the war began, and a large proportion of these cars is expected to be placed very shortly. There has been an increase in structural business coming to the mills, and the National Tube Co. has booked two pipe line orders aggregating nearly 35,000 tons. Steel bar business continues good, sheet demand is increasing a trifle, and wire demand is dropping off less than it usually does at this season. Altogether the steel trade prospects are distinctly better than a fortnight ago, and the actual production is probably a trifle heavier, easily averaging more than 70% of steel ingot capacity. The Pittsburgh and Valley mills are operating at an average of between 75 and 80%, while the Carnegie Steel Co. alone is operating at 80%.

Pig Iron—Two sales of basic iron, 15,000 and 4000 tons respectively, have been made by a Shenango Valley furnace interest, at $12.65 at furnace, 15c. above the regularly quoted market. This appears to be due to the fact that the delivery was to a near-by point which takes higher freight rates from other Valley furnaces. Buying of foundry iron continues good as to small lots. We continue to quote: Bessemer, $13.60; basic, $12.50; No. 2 foundry, $12.75@13; gray forge, $12.50@12.75; malleable, $12.75, f.o.b. Valley furnaces, 95c. higher delivered Pittsburgh.

Ferromanganese—Imports of ferromanganese during the last quarter of 1914 are just reported, and amounted to 19,884 gross tons, considerably more than had been estimated, as the British embargo was supposed to have become effective early in the quarter. The year's imports were therefore 82,217 tons, and the stocks of ore and alloy at the beginning of this year must have been fairly large. Scarcely any business has been done in new contracts at the recently announced price of $88, Baltimore, consumers being interested simply in deliveries on old contracts, which seem likely to come forward as absolutely needed. Demand for spot lots is very limited, the market being $90@95 per ton.

Steel—The Central Steel Co., Massillon, O., has made its initial sale of steel, 6000 tons, to the Cleveland Steel Co. The American Iron & Steel Co. at Lebanon, Penn., has bought 4000 tons of billets, presumably from an Eastern mill. Billets are about $18.50@19 and sheet bars about $19@19.50, at maker's mill, Youngstown, and about 50c. higher at maker's mill, Pittsburgh. The Carnegie Steel Co. is out of the market on openhearth sheet bars. Rods are $25, Pittsburgh, with the export demand holding up very well.

FOREIGN IRON

British Foreign Trade in Iron and Steel three months ended Mar. 31 is valued by the Board of Trade returns as below:

	Exports	Imports	Excess
Iron and steel	£7,732,850	£1,531,755 Exp.	£6,201,095
Machinery, hardware, etc.	6,952,184	2,956,463 Exp.	3,995,721
Totals	£14,685,034	£4,488,218 Exp.	£10,196,816
Totals, 1914	28,014,275	7,942,340 Exp.	20,071,935

The quantities of iron and steel exported were 1,206,435 tons in 1914, and 654,548 in 1915; decrease, 551,887 tons. Quantities imported, 577,490 tons in 1914, and 183,057 in 1915; decrease, 394,439 tons.

German Pig Iron Production in March is reported by the German Iron & Steel Union at 938,438 metric tons, which is 134,815 tons more than in February, but 664,458 tons less than in March, 1914. For the three months ended Mar. 31 the total make was 4,615,261 tons in 1914, and 2,616,194 tons in 1915, a decrease of 1,999,067 tons, or 43.3%, this year.

IRON ORE

Shipments of iron ore from the Lake Superior region in April were larger than expected. The total shipments by ports are reported by the "Iron Trade Review" as below, in long tons:

Port	1914	1915	Changes
Escanaba	110,729	49,307	D. 61,422
Marquette	.....	4,438	I. 4,438
Ashland	40,838	43,949	I. 3,111
Superior	62,338	87,175	I. 24,837
Duluth	.....	174,989	I. 174,989
Two Harbors	55,781	143,974	I. 88,193
Total	269,686	503,832	I. 234,146

The greatest activity was at Duluth and Two Harbors. It is expected that May shipments will be light, as ore will be held back to get the benefit of the rate reduction.

LAKE ORE AND COAL RATES

Lake freight rates for three years past, as compiled by the "Marine Review" of Cleveland, are as follows, in cents:

	1912	1913	1914
Iron ore, Escanaba to L. Erie ports	38.72	40.00	35.00
Iron ore, Marquette to L. Erie ports	48.72	50.00	45.00
Iron ore, Duluth to L. Erie ports	53.72	55.00	50.00
Anthracite, Buffalo to Chicago	30.00	35.00	30.00
Anthracite, Buffalo to Duluth	30.00	30.00	30.00
Bituminous coal, L. Erie to Chicago	30.00	35.00	30.00
Bituminous coal, L. Erie to Duluth	30.00	30.00	30.00

Charge to vessels for unloading iron ore, 10c. per ton.

In former years there was often a considerable difference between contract rates and the wild or outside rates. So much of the business is now done by contract boats that the wild rate has practically disappeared.

COKE

The British government has prohibited the exportation of coal and coke from Great Britain, to date from May 13, except to colonies of the country or allied nations.

Connellsville—A Valley furnace interest has removed its contract for high-grade Connellsville furnace coke, involving about 10,000 tons a month over the second half, the price not being stated. Other second half inquiry hangs fire and the furnace coke market shows little life. Foundry coke is looking up, there being heavier sales of prompt while a few contracts are being entered for the twelvemonth beginning July 1. We quote: Furnace coke, prompt, $1.50@1.55; contract to July 1, $1.60@1.65; to Dec. 31, $1.75; foundry coke, prompt, $2.@2.35; contract, $2.20@2.35, per net ton at ovens.

The "Courier" reports production in the Connellsville and Lower Connellsville region in the week ended May 1 at 292,891 tons, a decrease of 6602 tons, and shipments at 303,377 tons, an increase of 9711 tons.

Anthracite Shipments in April were 6,486,201 long tons, being 1,500,803 tons more than in March and 414,037 tons more than in April, 1914. For the four months ended Apr. 30 the total shipments were 20,534,050 tons in 1914, and 20,481,241 tons in 1915; a decrease of 52,809 tons, or 0.26% this year.

Fuel Exports from Great Britain three months ended Mar. 31, in long tons:

	1914	1915	Changes
Coal	17,430,369	11,219,726	D. 6,210,643
Coke	301,749	235,174	D. 66,575
Briquettes	502,181	243,348	D. 258,833
Steamer coal	5,035,448	3,978,631	D. 1,056,817
Total	23,269,747	15,676,879	D. 7,592,868

The imports of fuel are insignificant, amounting only to 5707 tons in 1914 and 803 tons this year.

Chemicals

NEW YORK—May 12

The general market remains rather quiet, but is still disturbed by the situation abroad.

Arsenic—Business is moderate and supplies seem to be equal to the demand. Prices are unchanged at about $4 per 100 lb. for both spot and futures.

Copper Sulphate—Business has been fair and sales about as usual. The advance in copper metal has made prices very firm. Quotations are $7 per 100 lb. for carload lots and $7.25 per 100 lb. for smaller parcels.

Nitrate of Soda—Business is reported improving and prices are firm and unchanged. Quotations are 2.30c. per lb. for spot and for all positions this year.

Assessments

Company	Delinqe	Sale	Amt.
Advance, Mont.	May 1	June 1	$0.005
Andes Silver, Nev.	May 4	May 25	0.03
Argenta, Ida.	May 10	June 10	0.001
Belcher, Nev.	May 15	June 8	0.15
Best & Belcher, Nev.	May 12	June 1	0.05
Caledonia, Nev	May 11	June 1	0.05
Cash Boy, Nev.	May 17	June 17	0.01
Cedar Creek, Ida.	May 5	June 5	0.005
Consolidated Imperial, Nev.	Apr. 27	May 18	0.01
Con. Virginia, Nev.	May 4	May 25	0.10
Contact Copper, Mich.	May 15	.....	0.50
Crown Point, Nev.	May 17	June 8	0.15
Diam'field Black Butte, Nev.	Apr. 30	June 3	0.01
Emerald, Utah (three instal.)	.....	June 9	0.01
Enterprise, Ida. (post.)	.....	May 20	0.002
Exchequer, Nev.	May 11	June 1	0.03
Gold Mt., Utah	May 10	May 27	0.0025
Hancock Cons., Mich.	Sept. 1	.....	1.00
Houghton, Mich.	May 25	.....	1.00
Idaho-Nevada, Ida	May 10	June 5	0.002
Jack Waite, Ida. (post.)	.....	May 22	0.01
Laclede, Ida.	May 24	June 14	0.003
Majestic-Idol, Nev.	Dec. 15	Jul. 20	0.005
Mullan, Ida.	Apr. 24	May 24	0.002
Mountain Rose, Ida.	Apr. 19	May 19	0.001
Nevada-Douglas, Nev.	Apr. 24	June 10	0.10
New Arcadian, Mich.	June 1	.....	0.50
New Hope, Ida.	May 5	June 2	0.002
Ophir, Nev.	June 4	June 25	0.05
Overman, Nev.	May 19	June 8	0.05
Raven, Ida.	May 15	June 14	0.0006
Royal, Ida.	June 1	July 6	0.0015
Samson, Ida (post)	.....	June 3	0.002
Sierra Nevada, Nev	May 10	June 1	0.05
Silver Cliff, Ida. (post.)	.....	May 29	0.0025
Silver Moon, Ida	May 18	June 18	0.005
Silver Mountain, Ida.	May 15	June 15	0.002
Silver Pick, Nev.	June 5	July 12	0.01
Smuggler	Apr. 17	May 17	0.0025
Tarbox, Ida.	Apr. 26	May 28	0.0025
United Tintic, Utah	May 25	June 15	0.005
Utah United, Utah	May 20	June 10	0.01
Virginia, Ida.	May 10	May 29	0.02
Wisconsin, Ida.	May 15	June 15	0.003
Yellow Jacket, Nev	May 14	June 8	0.15

Stock Quotations

Among sales at auction we note: $15,000 Gates Coal & Coke Co. 1st mort., August, 1912, coupons on, $70 lot; $1,065,000 Dering Coal Co. 1st mort., April, 1909, coupons on, 20.

COLO. SPRINGS May 11		SALT LAKE May 11	
Name of Comp.	Bid.	Name of Comp.	Bid.
Acacia	.04	Beck Tunnel	.05
Cripple Cr'k Con.	.01	Black Jack	.08
C. K. & N.	.04½	Colorado Mining	.11
Doctor Jack Pot.	.09½	Crown Point	.01½
Elkton Con.	.43	Daly-Judge	5.25
El Paso	1.05	Gold Chain	.15
Findlay	.03½	Grand Central	.53
Gold Dollar	.04	Iron Blossom	.66
Gold Sovereign	.04½	Little Bell	.12
Golden Cycle	1.79½	Lower Mammoth	.04½
Isabella	.18½	Mason Valley	3.00
Jack Pot	.06½	May Day	.15½
Jennie Sample	‡.02	Opohongo	.01
Jerry Johnson	.04	Prince Con.	.42½
Lexington	‡.008	Seven Troughs	.01½
Mary McKinney	.33	Silver King Coal'n	3.05
Pharmacist	.01½	Silver King Con.	1.82½
Portland	1.19	Sioux Con.	.02
Raven B. H.	.03½	Uncle Sam	.03
Vindicator	1.69	Yankee	.01

TORONTO May 11			
Bailey	.02	Dome Exten.	.09
Coniagas	.04	Foley O'Brien	.31
Peterson Lake	.23	Hollinger	26.50
Right of Way	.04	Imperial	.06½
Seneca Superior	1.12½	Jupiter	.11
Silver Queen	.01	McIntyre	.48
T. & Hudson Bay	18.00	Pearl Lake	.01
Timiskaming	.38	Porcu. Gold	‡.25
Wettlaufer-Lor.	.03	Preston E. D.	.02
Big Dome	12.75	Rea	.10

SAN FRANCISCO May 11			
Comstock Stocks		Misc. Nev. & Cal.	
Alta	‡.04	Belmont	4.12½
Andes	.05	Jim Butler	.76
Belcher	.15	Lone Star	.07
Best & Belcher	.05	MacNamara	.03
Caledonia	.20	Midway	.16
Challenge Con.	‡.06	Mont.-Tonopah	.35
Confidence	.09	North Star	.16
Con. Virginia	.12	Rescue Eula	.12
Gould & Curry	.02	West End Con.	.72
Hale & Norcross	.03	Atlanta	.22
Julia	‡.01	Booth	.37
Mexican	.29	C.O.D. Con.	.04
Occidental	.79	Comb. Frac.	.08
Ophir	.09	Jumbo Extension	.92
Overman	.02	Pitts.-Silver Peak	.12
Potosi	‡.01	Round Mountain	.42
Savage	.02	Sandstorm Kendall	.07½
Sierra Nevada	.10	Silver Pick	.07
Union Con.	.17	Central Eureka	.17
Yellow Jacket	.19	So. Eureka	‡2.25

N. Y. EXCH. May 11		BOSTON EXCH May 11	
Name of Comp.	Clg.	Name of Comp.	Clg.
Amalgamated	67½	Adventure	2½
Am.Sm.&Ref.,com.	67½	Ahmeek	380
Am. Sm. & Ref., pf.	105½	Alaska Gold M.	34½
Am. Sm. Sec., pf. B.	80	Algomah	2½
Anaconda	32⅜	Allouez	‡53½
Batopilas Min.	⅛	Am. Zinc	38½
Bethlehem Steel	136½	Ariz. Com., ctfs.	7½
Bethlehem Steel, pf.	110	Bonanza	.35
Chino	44⅜	Butte-Balaklava	3
Colo. Fuel & Iron.	27	Butte & Superior	62½
Federal M. & S., pf.	25	Calumet & Ariz.	64½
Great Nor., ore., ctf.	33	Calumet & Hecla	585
Guggen. Exp.	57½	Centennial	19
Homestake	117½	Cliff	1½
Inspiration Con.	29⅝	Copper Range	53
Mex. Petroleum	75⅛	Daly West	3
Miami Copper	24½	East Butte	11½
Nat'l Lead, com.	60½	Franklin	11
National Lead, pf.	108	Granby	84
Nev. Consol.	14⅜	Hancock	21
Ontario Min.	3½	Hedley	26⅛
Quicksilver, pf.	1½	Helvetia	.70
Ray Con.	22¾	Indiana	7½
Republic I&S, com.	26½	Island Cr'k, com.	43½
Republic I&S, pf.	83½	Island Cr'k, pfd.	89
SlossSheffi'd, com.	33	Isle Royale	27
Tennessee Copper	31½	Keweenaw	2½
Utah Copper	64⅛	Lake	12½
U. S. Steel, com.	53⅛	La Salle	6½
U. S. Steel, pf.	106½	Mass.	14½
		Mayflower	5½
N. Y. CURB May 11		Michigan	2
Name of Comp.	Clg.	Mohawk	71
Alaska Juneau, w.i.	14½	New Arcadian	10
Alta Con.	.85	North Butte	32
Beaver Con.	.38	North Lake	2½
Big Four	.07	Ojibway	2½
Blue Bell	.05	Old Colony	4½
Braden Copper	7½	Old Dominion	52
Buffalo Mines	9/16	Osceola	78½
Can. Cop. Corpn.	1½	Quincy	86
Can. G. & S.	.03	Santa Fe	3
Caribou	‡.50	Shannon	9
Cashboy	.06	Shattuck-Ariz.	26½
Chambers Ferland	.17	Superior	31
Con. Ariz. Sm.	.75	Superior & Bost.	3½
Con. Coppermines	1½	Tamarack	33
Davis-Daly	1⅛	Trinity	5
Diam'field-Daisy	.07	Tuolumne	‡.40
Dia. Black B.	.03	U. S. Smelting	36½
Florence	.49	U. S. Smelt'g, pf.	44½
Goldfield Con.	1 7/16	Utah Apex	2½
Goldfield Merger	.23	Utah Con.	12
Greene Cananea	.28½	Victoria	3
Kerr Lake	4⅛	Winona	4½
La Rose	.50	Wolverine	57
McKinley-Dar-Sa.	.28	Wyandot	1⅛
Mines of Am.	2⅛		
Nevada Hills	.22	BOSTON CURB May 11	
New Utah Bingham	1½	Name of Comp.	Bid.
Nipissing Mines	5⅛	Alvarado	.50
Ohio Copper	.25	Bingham Mines	6
Oro	.08½	Boston Ely	.27
Pacific Smelt.	‡.09⅛	Butte & Lon'n Dev.	.21
South Utah	‡⅛	Calaveras	1⅛
Stand'd Oil of N.J.	402	Calumet-Corbin	.10
Standard S. L.	1.43½	Chief Con.	.80
Stewart	1 1/16	Corbin	.90
Tonopah	6 1/16	Cortez	.30
Tonopah Ex.	3½	Crown Reserve	.85
Tonopah Merger	.35	Eagle & Blue Bell	1½
Tularosa	3/16	First Nat. Cop.	2½
West End Ex.	.05	Houghton Copper	3
Yukon Gold	2⅛	Iron Cap Cop., pf.	5
		Majestic	.42
LONDON Apr. 26		Mexican Metals	.17
Alaska Tre'dwell	£7 6s 3d	Nevada-Douglas	.70
Cam & Motor	0 15 0	New Baltic	3½
Camp Bird	0 9 6	Oneco	1½
El Oro	0 7 10½	Raven Copper	.07
Esperanza	0 8 6	Smokey Dev.	.30
Mexico Mines	3 16 3	So. Lake	6⅛
Oroville	0 12 3	Tonopah Victor	‡.17
Santa Gert'dis.	0 7 6	Trethewey	.14
Tomboy	1 4 3	United Verde Ext.	3 1/16
Tough Oakes	0 14 3		

‡Last Quotations.

Monthly Average Prices of Metals

SILVER

Month	New York			London		
	1913	1914	1915	1913	1914	1915
January	62.938	57.572	48.855	28.983	26.553	22.731
February	61.642	57.506	48.477	28.357	26.573	22.753
March	57.870	58.067	50.241	26.669	26.788	23.708
April	59.490	58.519	50.250	27.416	26.958	23.709
May	60.361	58.175	.....	27.825	26.704	.....
June	58.990	56.471	.....	27.199	25.948	.....
July	58.721	54.678	.....	27.074	25.219	.....
August	59.293	54.344	.....	27.335	25.979	.....
September	60.640	53.290	.....	27.986	24.260	.....
October	60.793	50.654	.....	28.083	23.199	.....
November	58.995	49.082	.....	27.263	22.703	.....
December	57.760	49.375	.....	26.720	22.900	.....
Year	59.791	54.811	.....	27.576	25.314	.....

New York quotations cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

COPPER

Month	New York		London			
	Electrolytic		Standard		Best Selected	
	1914	1915	1914	1915	1914	1915
January	14.223	13.641	64.304	60.756	69.488	65.719
February	14.491	14.394	65.259	63.494	70.188	*
March	14.131	14.787	64.276	66.152	69.170	*
April	14.211	16.811	64.747	75.069	69.313	*
May	13.996	.....	63.182	.....	67.786	.....
June	13.603	.....	61.336	.....	66.274	.....
July	13.223	.....	60.540	.....	64.955	.....
August	*	.....	‡	.....	‡	.....
September	*	.....	‡	.....	‡	.....
October	*	.....	‡	.....	‡	.....
November	11.739	.....	53.227	.....	*	.....
December	12.801	.....	56.841	.....	*	.....
Year	.....	.....	.....	.....	.....	.....

TIN

Month	New York		London	
	1914	1915	1914	1915
January	37.779	34.263	171.905	156.550
February	39.830	37.415	181.556	176.925
March	38.038	48.426	173.619	180.141
April	36.154	47.884	163.963	166.225
May	33.360	.....	150.702	.....
June	30.577	.....	138.321	.....
July	31.707	.....	142.517	.....
August	*	.....	‡	.....
September	32.675	.....	‡	.....
October	30.284	.....	‡	.....
November	33.304	.....	1 9.391	.....
December	33.601	.....	147.102	.....
Av. year	34.301	.....	.....	.....

LEAD

Month	New York		St. Louis		London	
	1914	1915	1914	1915	1914	1915
January	4.111	3.729	4.011	3.548	19.665	18.606
February	4.048	3.827	3.937	3.718	19.606	19.122
March	3.970	4.053	3.850	3.997	19.651	21.883
April	3.810	4.221	.688	4.142	18.225	21.094
May	3.900	.....	3.808	.....	18.503	.....
June	3.900	.....	3.810	.....	19.411	.....
July	3.891	.....	3.738	.....	19.051	.....
August	3.875	.....	3.715	.....	‡	.....
September	3.828	.....	3.658	.....	‡	.....
October	3.528	.....	3.384	.....	‡	.....
November	3.683	.....	3.585	.....	18.500	.....
December	3.800	.....	3.662	.....	19.097	.....
Year	3.862	.....	3.737	.....	.....	.....

SPELTER

Month	New York		St. Louis		London	
	1914	1915	1914	1915	1914	1915
January	5.262	6.386	5.112	6.211	21.533	30.844
February	5.377	8.436	5.228	8.255	21.413	39.819
March	5.250	8.541	5.100	8.366	21.460	44.141
April	5.113	10.012	4.963	9.837	21.569	49.888
May	5.074	.....	4.924	.....	21.393	.....
June	5.000	.....	4.850	.....	21.345	.....
July	4.920	.....	4.770	.....	21.568	.....
August	5.568	.....	5.418	.....	‡	.....
September	5.380	.....	5.230	.....	‡	.....
October	4.909	.....	4.750	.....	‡	.....
November	5.112	.....	4.962	.....	25.016	.....
December	5.592	.....	5.430	.....	27.369	.....
Year	5.213	.....	5.061	.....	.....	.....

New York and St. Louis quotations, cents per pound. London, pounds sterling per long ton. * Not reported, ‡ London Exchange closed.

PIG IRON IN PITTSBURGH

Month	Bessemer		Basic		No. 2 Foundry	
	1914	1915	1914	1915	1914	1915
January	$14.94	$14.59	$13.23	$13.45	$13.99	$13.90
February	15.06	14.55	14.12	13.45	14.08	13.90
March	15.07	14.55	13.94	13.45	14.10	13.95
April	14.90	14.55	13.90	13.45	14.13	13.95
May	14.90	.....	13.90	.....	14.27	.....
June	14.90	.....	13.90	.....	13.96	.....
July	14.90	.....	13.90	.....	13.90	.....
August	14.90	.....	13.90	.....	14.08	.....
September	14.90	.....	13.90	.....	14.03	.....
October	14.84	.....	13.75	.....	13.97	.....
November	14.59	.....	13.43	.....	13.83	.....
December	14.70	.....	13.45	.....	13.83	.....
Year	$14.88	.....	$13.78	.....	$14.01	.....